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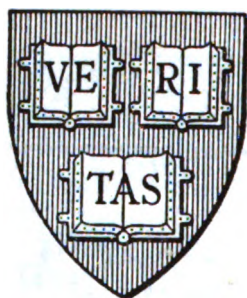
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MORTGAGE STATISTICS.

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CHAPTER I.

Real estate mortgage debt became a prominent question throughout the country about two years ago. Western farmers were borrowing large amounts of Eastern capital at high rates of interest, and as soon as it was understood that the loans in each of the principal-borrowing states made a total of large proportions it became uncertain whether the product of agriculture could pay back to the lenders so great an amount of wealth or, indeed, sustain the annual interest charge. The amounts of this borrowed wealth were guessed at and roughly estimated, and it was not long before guesses and estimates became positive assertions and grew into marvellous stories of debt burden, which existing wealth production could not hope to diminish or carry.

A member of the national House of Representatives, on May 12, 1888, quoted, without question of the accuracy of his figures, the statement of a farmers' "organ," that the mortgage debt upon farms in Ohio amounted to \$701,000,000;

Indiana, \$398,000,000; Illinois, \$620,000,000; Wisconsin, \$250,000,000; Michigan, \$350,000,000; Minnesota, \$175,000,000; Iowa, \$351,000,000; Nebraska, \$140,000,000; Kansas, \$203,000,000; Missouri, \$237,000,000; total farm mortgage debt in these ten states, \$3,425,000,000. The *Bankers' Monthly* could not have had the same sources of information, for it represented the farm mortgage debt as follows: Kansas, \$235,000,000; Indiana, \$635,000,000; Iowa, \$567,000,000; Michigan, \$500,000,000; Wisconsin, \$357,000,000; Ohio, \$1,127,000,000. These statements of "fact" far exceeded those of the farmers' publication, and were by no means so extreme as were apparently sober statistics of other publications; indeed, one of them asserted without qualification that the farm mortgage debt of Illinois was about \$1,200,000,000.

How these vast amounts of debt were established no one pretended to say; nevertheless, the real estate mortgage debt of these ten states could not have been ascertained without the labor of 125 men for 75 to 100 days in the field, of half as many men for the same time in the office, and without an expense of \$75,000 to \$100,000, so as to establish the debt within probably 50 per cent of the truth. Though it was claimed that the farm debt of Ohio was \$1,127,000,000, yet the total assessed valuation of all the real estate in the state, including non-agricultural and mortgaged real estate, is quoted by the report of the Bureau of Statistics of Labor of that state for 1888¹ at \$1,220,262,525, or hardly more than the represented debt of the agricultural real estate.

The agitation of the mortgage question was taken in hand by the Single Tax clubs and the believers in Henry George's land theories, and some alarm was aroused over the supposed stupendous proportion of debt upon farms and homes, which was reducing the people to the relationship of landlord and tenant, with fewer landlords and more tenants as time passed on. It does not matter for the moment whether these claims were entirely true or to what extent they were partly true;

¹ Page 191.

they were made with such earnestness and confidence that they were widely accepted as true, or very nearly so, and awakened deep concern in the future condition of the owners of homes and farms, and of those who, it was supposed, had been ousted from ownership, and in all likelihood could never regain it.

Suddenly, from many directions, the attention of statisticians and students of social and economic questions was directed toward the problem. For want of facts, little could be advanced upon the matter except theory, but several state bureaus of labor statistics set to work gathering information, — namely, the bureaus of Illinois, Michigan, Ohio, Connecticut, and Nebraska, and about a year later the bureau of New Jersey. The investigation of the last-named bureau is still progressing, but the results of the investigations of the other states were published in their reports for 1888.

Hon. John Jenkins, deputy commissioner of the Nebraska bureau, undertook, in connection with other information about farms and farmers, to learn about mortgages. The circular-letter method was adopted, and, while little can be said in its favor, yet it seems to have been the only one open to the commissioner. The number of circulars sent to farmers is not given, but replies to 216 of them were received; 185 of these persons owned their farms; 113 farms were mortgaged at rates of interest ranging from 6 to 10 per cent; 89 persons saved something above expenses during the preceding year.²

The method of Hon. Samuel M. Hotchkiss, commissioner of the Connecticut bureau, was the personal inquiry of special agents. They "visited and secured statistics from 693 farms selected from representative towns in each county. The investigation was conducted systematically. From three to five towns in each county were visited, and the farms selected were widely distributed over the towns."³ Opinions

² First Biennial Report of the Bureau of Labor and Industrial Statistics of Nebraska, page 386.

³ Fourth Annual Report of the Bureau of Labor Statistics of Connecticut, page 142.

may differ as to whether the judgment of any one person is sufficient to select several hundred farms in a state whose statistics will stand for other farms than the ones from which they were derived. However that may be, the commissioner shunned the evil of the circular-letter plan, and doubtless greatly improved upon it.

Of the 698 Connecticut farms 241 were mortgaged for 84.8 per cent of their value at an average interest rate of 5.66 per cent. The number of farms showing losses or excess of expense over income was 136, or 56 per cent of the mortgaged farms, not including family expenses in the account.

Competent men were employed by Hon. A. D. Fassett, commissioner of the Ohio bureau, to take from the real estate records the amount of the loans secured by the uncanceled mortgages dated in "the eighteen years covering the period from 1870 to 1888, inclusive, to June 1st of the latter year. There are included in these, of course, many mortgages that have been paid but not cancelled. They include mortgages that have been placed upon the property of corporations operating pipe lines for gas, oil, and water."⁴ An unknown amount of partial payments made upon the original amounts of loans was also included.

The total amount of the uncanceled mortgages "resting upon all real property in the state, exclusive of railroads, is \$830,999,205.78. This includes the mortgages on farm and city property as well, and of course includes the mortgages resting upon the mining and manufacturing interests, which, as will be seen, bear a large portion of the debt burden of the state."⁴

It is probably true that this established debt is larger than the true amount of the debt June 1, 1888. Only a very small portion of the existing real estate mortgage debt of Ohio was created prior to 1870. It has been ascertained for the Eleventh Census that only 3 per cent of the real estate mortgage debt of the people of Hampden county, Mass., was

⁴ Twelfth Annual Report of the Bureau of Statistics of Labor of Ohio, page 20.

created previous to 1870; that only 4 per cent of debt in Sangamon county, Ill., was created prior to 1880; only 5 per cent of debt in Scott county, Iowa, was created before 1880; and only $\frac{1}{3}$ of 1 per cent of debt in Cattaraugus county, New York, was created before 1870. It has been discovered in experimental work for the Census that the proportion that the amount of uncanceled but fully paid mortgages bears to the total amount of all uncanceled mortgages is larger than these percentages of debt that is older than 1870 and 1880, respectively; and it has also been discovered that the proportion that partial payments bear to the original amount of all loans surviving at a given date is alone much larger than the percentages of old debt above mentioned. So that it is beyond doubt that the sum of the original amounts of uncanceled loans upon real estate in Ohio, for the last eighteen years, is considerably larger than the present amount of real estate mortgage debt in that state.

Yet the commissioner of the Ohio bureau established a debt upon all real estate which was only a third to a half of the previously reported debt upon farms alone. Thirty per cent of the established debt belongs to the counties in which Cincinnati, Dayton, Cleveland, Toledo, and Columbus are situated, and the presumption is that more than one-half, perhaps three-quarters, of the real estate mortgage debt of the state is upon village and city property. The real estate mortgage debt of Hampden county, Mass., is almost entirely upon village and city property.

In Michigan, Hon. A. H. Heath, commissioner of the bureau, pursued still another method. Supervisors gathered the facts "directly from the farmers at the time of taking the assessment of their respective townships during the month of April, 1887, upon blanks specially prepared and furnished for this work."⁵ Whether the supervisors in some of the townships refused to ask the questions contained on the

⁵ Fifth Annual Report of the Bureau of Labor and Industrial Statistics of Michigan, page 1.

bureau's blank, or whether the commissioner did not attempt to get the desired information in all townships, does not appear in the report; but reports were received from 780 of the 1,135 townships and were not received from 355 townships. The farms for which facts were reported numbered 90,803, or 58 per cent of the farms in the state as ascertained by the Census of 1884.⁶

The question arises whether these statistics are applicable to the farms in Michigan other than those from which they were derived. If complete reports were received for the farms of any certain county, and none were received from a neighboring county with similar characteristics with respect to soil, markets, and products, it may not be unfair to assume *a priori* that the proportion of mortgaged farms to the total number of farms, and the proportion of mortgage debt to the valuation of mortgaged farms, are not radically different from the known proportions of the fully reported county.

With full reports from all the farms of each county, the extent to which this assumption is true could be demonstrated; but so many farms were unreported from the townships in which inquiries were made, and the uncertainty is so great as to whether the ascertained results for a portion of the farms may be extended to all farms within each township, that it cannot be conclusively demonstrated whether the proportions found in one county are substantially the same as those existing in neighboring counties, not otherwise differing in their general characteristics. However, as far as the facts go, they quite generally support the assumption.

The three rows of counties extending across the southern portion of the state from east to west have a similar agricultural character, and they show the following ratios: Number of mortgaged farms to the total number of reported farms, and of mortgage debt to the assessed valuation of mortgaged farms: — ⁷

⁶ Fifth Annual Report of the Bureau of Labor and Industrial Statistics of Michigan, pages 5, 1, 74.

⁷ *Id.*, pages 70-75.

County.	Ratios of Number of Mortgaged Farms to Total Number of Re- ported Farms.	Ratios of Mortgage Debt to Assessed Val- uation of Mortgaged Farms.
	<i>Per cent.</i>	<i>Per cent.</i>
Allegan.....	48.3	48.5
Van Buren.....	49.5	41.0
Berrien.....	34.6	47.8
Cass.....	45.3	37.2
St. Joseph.....	34.3	44.2
Kalamazoo.....	39.7	44.0
Barry.....	52.7	47.5
Eaton.....	46.8	39.7
Calhoun.....	48.1	53.5
Braich.....	47.0	41.6
Hillsdale.....	35.9	44.4
Jackson.....	44.2	50.2
Ingham.....	45.7	44.5
Livingston.....	46.4	45.7
Washtenaw.....	43.8	47.9
Lenawee.....	41.2	42.4
Monroe.....	46.7	37.7
Wayne.....	38.0	45.8
Oakland.....	27.6	32.3
Macomb.....	42.1	46.6

The general uniformity of results in these counties is prominent, especially in the matter of ratio of debt to assessed valuation.

The ratios of the number of mortgaged farms to the total number of reported farms in adjoining counties differ as much as 18.8 per cent; but, leaving out Oakland county, they differ as much as 15.2 per cent. That is to say, if a ratio drawn from the known facts of one county, in respect to the number of mortgaged farms, were to be applied to an adjoining county, among these twenty counties, the greatest error would be 18.8 per cent of the truth; yet the general error is not large, and is as small as any one should expect to find in a subject so difficult as this is to approach statistically. The mean error for any two adjoining counties is 6.9 per cent.

It is possible that full reports from all the partly reported counties would have been conducive to uniformity of results; at any rate, so far as the Michigan investigation relied upon

uniformity of results and the extension of known results to unreported townships, it does not seem to have been far from the truth. The extension of results derived from reported farms to farms about which reports were refused is another matter, and there may be psychological reasons why this is not sound.

The assessed valuation of the 90,803 reported farms in Michigan was \$194,854,688, and the mortgage indebtedness of these farms was \$87,456,372, or about 47 per cent of the assessed valuation, with an average rate of interest of 7.2 per cent.⁸

The commissioner says: "Estimating all the farms in the state on the basis of reports, we have an assessed valuation of \$335,378,025, and a mortgage indebtedness of \$64,892,580.80, with an annual interest of \$4,686,265.81, on farms alone."⁹

It should be borne in mind that these bureaus attacked a problem of great dimensions with but a small amount of money available for the purpose, and that the results, if not in every respect satisfactory and conclusive, after all represent large returns for the expenditure of the money employed.

The Illinois bureau had to contend with this disadvantage, and the Secretary of the board of commissioners, Col. John S. Lord, resorted to a "short cut" for establishing existing debt, and obtained at the same time a greater variety of results than any of the other bureaus had obtained. With respect to real estate mortgages he abstracted from the records these facts: The number of the mortgages; the amount of the loan secured by each mortgage; whether the mortgage covered agricultural land or village and city lots; the number of acres or lots; the time within which the payment was promised; whether to secure purchase money; mortgages made to building and loan associations; mortgages made to non-residents of the state; and the rate of interest

⁸ Fifth Annual Report of the Bureau of Labor and Industrial Statistics of Michigan, pages 74, 75. ⁹ *Id.*, page 1.

per annum These facts were taken for the years 1870, 1880, and 1887, and were aggregated by classes and by years for each county. For the same years the number of recorded chattel mortgages was ascertained; the amounts secured by them; the contract time of payment; the rate of interest; and a classification of the personal property covered by them, as live stock and farm implements, household goods and wearing apparel, merchandise and fixtures, machinery and tools, growing crops, garnered crops, pianos, organs, sewing-machines, and miscellaneous.¹⁰

The special interest of this investigation centres in the method of establishing the total amount of mortgage debt existing each year, rather than in the yearly totals. With boldness and originality Col. Lord resorted to the computation and use of the equated contract time of mortgages for this purpose. If two mortgages are made, one for \$500 to be paid five years from date, and the other for \$1,000 to be paid two years from date, the average duration of the contract time is three years, as is shown by the following computation:—

$$\begin{array}{r}
 \$500 \times 5 \text{ years} = 2,500 \\
 1,000 \times 2 \text{ years} = 2,000 \\
 \hline
 1,500 \qquad \qquad \qquad)4,500 \\
 \hline
 3 \text{ years.}
 \end{array}$$

The average equated contract time of mortgages upon acres, upon lots, and upon chattels was computed for each of the three years. For illustration of the process, taking only the equated contract time of mortgages upon acres in 1887, this was found to be 8.844 years. The total recorded debt upon acres for that year was \$87,040,770, and this was multiplied by the equated contract time, and the product, \$142,400,800, was called the principal of the debt upon acres in existence in 1887.¹¹

The report explains that "the hypothesis on which such

¹⁰ Fifth Biennial Report of the Bureau of Labor Statistics of Illinois.

¹¹ *Id.*, page LX.

calculation is based is that, for a limited number of consecutive normal years, the experience for the whole would probably be substantially uniform with that of any one of them. This implies only that the same general situation obtains in each of the three consecutive years, viz., that the aggregate amounts are practically the same, and the average term the same. In that case the total in force would consist, first, of those mortgages assumed during the year and maturing in three years; also those written in the year preceding and maturing the year following; and, finally, those of two years before maturing in the present."¹² That this was not far from the truth was subsequently discovered and positively demonstrated by Col. Lord, though the demonstration has not yet been published.

The employment of equated contract time established the total principal of the debt upon village and city real estate in the state in 1887 to be \$238,922,039, and the total principal of all the real estate mortgage debt to be \$381,322,389, of which 68 per cent was upon village and city real estate. The same process established the principal of the chattel mortgage debt to be \$20,730,779 in the same year.¹³

At the present time the only bureau of labor statistics investigating mortgage indebtedness is that of New Jersey. It is abstracting from the records of Essex county, in which Newark is situated, the following particulars regarding each mortgage recorded in the twelve years, 1856, 1870, 1875, 1880-88: Name of mortgagor and mortgagee corporation, name of city or township, amount of loan, number of acres, whether village and city lots, contract time, rate of interest, date of mortgage, and date of discharge, if cancelled; it is abstracting nearly the same facts regarding the foreclosures decreed by chancery court during the same years for the whole state, and this will include about all the foreclosures that were made; and the bureau is also counting the number of mortgages recorded in all the counties in 1888.

¹² Fifth Biennial Report of the Bureau of Labor Statistics of Illinois, page XXIX.

¹³ *Id.*, pages LX-LXIV.

CHAPTER II.

Finally, the mortgage problem found a place in the Eleventh Census act, approved March 1, 1889. The language reads: "He [the Superintendent of Census] shall also, at the time of the general enumeration herein provided for, or prior thereto, as the Secretary of the Interior may determine, collect the statistics of, and relating to, the recorded indebtedness of private corporations and individuals, and make report thereon to Congress." This part of the Census act was rejected by the House of Representatives, restored by the Senate, and finally agreed upon by both branches of Congress after conference of committees.

Hon. Robert P. Porter at once, after his appointment as Superintendent of Census, took great interest in this matter, both from the standpoint of statistics and from that of social and economic science, and he felt that the investigation should not proceed throughout the country without further light as to the plan of work and the method to be adopted. Three men who had worked upon the problem, or had developed some ideas about it, were appointed special agents to pursue several lines of experiment in Illinois, Iowa, New York, and Massachusetts. This was the only intelligent way to attack the problem, and without it Superintendent Porter realized that it would be a rash and ill-advised venture to go into the investigation at all with the object of ascertaining the total existing mortgage debt at any given date.

To those who are unacquainted with statistical experiences and the psychological difficulties to be overcome, nothing seems easier than to print one or twenty questions in a schedule, place it in the hands of an enumerator, and send him from house to house to get answers to them. Early in

the winter considerable pressure was brought to bear upon the Superintendent of Census to add to the population schedule several questions about mortgages and the ownership of farms and homes, or to give the enumerators a special schedule containing these questions and thus obtain answers at the time of the general enumeration in June, 1890. This plan is so very simple in its structure that it is difficult to convince many people that it is not fully practicable and easy of accomplishment. The Census act has in view no such procedure as this, but intends that the investigation of this subject shall be made by recourse to records. The Census committees of Congress had the subject under consideration, and came to the conclusion that it was dangerous to the remainder and principal portion of the enumeration to ask the people about their financial status. Hon. S. S. Cox, chairman of the Census committee of the House, in a speech upon the Census bill, July 11, 1888, said: "The danger signal is always out when too tempestuous a storm of schedules falls upon the Census Bureau."

Hon. Carroll D. Wright, Commissioner of the Department of Labor, in a communication to Representative Cox, dated May 9, 1888, in regard to the inclusion of inquiries regarding private indebtedness in the population schedule, wrote:—

"The addition of proposed inquiries to the population schedule would antagonize the Census, so far as the enumeration is concerned, before it commenced, and the enumerators would be handicapped from the start. The success of any enumeration depends very largely upon the good will of the public and the willingness of persons to comply with the reasonable request of the Government for information concerning their affairs. All inquiries, however, regarding the financial condition of the people have heretofore been met with great opposition, and undoubtedly would be again; although should such inquiries be added to the population schedule, it is safe to say that from 10 to 15 per cent, judging from past experience in such matters, would comply with the request of the Government and furnish the information relative to their indebtedness. Such a canvass, therefore, would have for its result partial success in certain directions at great expense, and a damaging influence upon the

whole census enumeration, both as to population and manufactures as well as agriculture. Considering the expense and the general injury to the work of the Census, this method seems hardly advisable."

If any questions were to be asked of the people in regard to their indebtedness, it was Commissioner Wright's idea that the collection of the information should "be made subsequent to and independent of the enumeration of the people in general" for representative towns or counties, "and by selecting counties the information might be collected so as to show the property value of each holding, and the indebtedness thereon, as originally made and as shown through the registry of deeds, further information being sought as to the payments in part liquidation of the recorded debt."

In the summer and autumn of 1889, the Superintendent of Census was petitioned by many Single Tax clubs, Knights of Labor assemblies, and farmers' and workingmen's associations, to ascertain "what percentage of the people in this country occupy their own homes and farms, and what proportion are tenants; and of those who occupy their own homes and farms what proportion of their property is free from debt; and of the homes and farms which are under mortgage what percentage of the value is so mortgaged."

Superintendent Porter, from his own experience and knowledge of the difficulties of the undertaking, did not dare to endanger the decennial enumeration by incorporating in it inquiries designed to get all this information, and in a letter of December 3, 1889, to Hon. James H. Berry, member of the Senate Census committee, he wrote:—

"These statistics cannot be got from records, because there are no records in this country which, on their face, disclose the information; consequently the statistics can be got only by a house-to-house canvass. It seems generally to be understood by the public that the information called for by these associations can be got by incorporating the necessary questions in the population schedule. If this were to be done there is no doubt that the enumeration of population would be in great danger of being wrecked. An attempt of this sort was made in the taking of the

Massachusetts census of 1875, by which it was sought to secure, by means of an individual schedule, data from workmen and working-women as to their wages and earnings, the number of rooms rented and annual rental paid, as well as procuring the ownership of the home and the mortgage incumbrance thereon. About 71,000 heads of families returned answers to these inquiries, and only 19 per cent of the persons who were asked whether they owned their homes replied that they did so, the remaining 81 per cent being composed of persons who did not own their homes and those who refused to answer; so that these statistics in Massachusetts are incomplete and do not represent the true condition of affairs in that state at that time.

"The only safe way to get these desired statistics about homes and farms is by an independent house-to-house canvass, unconnected with any other branch of census work, so that in case of failure to get trustworthy statements, no part of the general work of enumerating population and industry would be jeopardized in any way. To conduct this independent canvass it would be necessary for enumerators to travel over every street and highway in the United States and visit some 18,000,000 families. The cost of doing this would be between one and two million dollars at least, based on a general estimate of a rate per family sufficient to insure, both in sparsely and thickly settled districts, a fair compensation for a day's work, this rate per family varying from five cents, the minimum rate that ought to be paid, to ten cents and upwards."

The expense of the only proper way to get the desired statistics by enumerators was consequently too great to be charged upon the appropriation of \$6,400,000 for census purposes. The Superintendent of Census has frequently announced his desire to undertake the "farm and home" investigation, if it may be done in the proper way and with a sufficient amount of money to carry it through with success.

The same kind of a question arose in the Tenth Census in connection with the collection of the statistics of the ownership of the public debt of the United States, which was a part of Superintendent Porter's contribution of statistics of "wealth, debt, and taxation" to that census. The Census act of 1879 provided for the gathering of this information by enumerators upon questions in the population schedule. Upon the recommendation of Gen. Francis A. Walker, then Superintendent of the Tenth Census, this portion of the act

was repealed in April, 1880, so far as it placed the work in the hands of enumerators. At that time he wrote: —

"It should be remembered that, in spite of the scheme of 'prior schedules' in any degree to which it is likely to be used by the Census office, the questions on the census schedules will often have to be answered by the women of the family in the temporary or protracted absence of the head thereof. Usually it may be assumed that the wife or daughter knows little or nothing respecting the investment of the family property, and even in the cases where the knowledge existed would hesitate to answer on such a point without the consent of the head of the family. It is a fundamental maxim of enumeration that as few matters as possible should be introduced in the house-to-house inquiry, respecting which the wife and the grown daughter cannot be assumed to be equally intelligent with the husband and father. Even when the head of the family is present the inquiry respecting property in United States bonds is unlikely to secure trustworthy answers, and is certain to provoke distrust and engender animosity. On every account, therefore, the Superintendent deems it desirable that the interrogatory should be stricken from the schedule."¹⁴

In a letter of December 28, 1889, to Hon. D. B. Henderson, of the House Census committee, concerning recorded indebtedness, Superintendent Porter writes: —

"The enumerator does not see an average of more than one in seven of the population, and therefore a question which has to be asked by forty thousand officers respecting sixty-five millions of people should not be, in order to obtain a successful answer, of a character that only the particular individual himself can answer accurately. The enumerator's information in regard to the ownership of bonds, the possession of property, the amount of debt, the value of homes, etc., is therefore in a majority of cases second-hand at the best, and is likely in most cases to be misleading."

The Michigan investigation previously referred to affords the opportunity for representing mathematically the extent of the failure that goes with inquiring of people the amount of their debts. As will be remembered, the questions were asked of farmers by supervisors at the time of the valuation of property for the assessment of taxes in April, 1887. The report of the bureau gives the number of farms for which

¹⁴ Letter to the Census Committee of the House of Representatives.

answers were made in each township where inquiries were made, and the Census of 1884 gives the number of farms in each township, a number slightly less than the number of farms in 1887.

The percentages of the refusals to answer of the total number of farms in 1884, for the six counties in the second tier from the southern border of the state, are as follows: Van Buren, 19.8; Kalamazoo, 21.3; Calhoun, 14.0; Jackson, 17.8; Washtenaw, 25.9; Wayne, 18.8. That is to say, one-seventh to one-quarter of the farmers refused to answer.¹⁵

Yet the efforts of the supervisors were undoubtedly more successful than those of enumerators would be, because all real estate owners are taken account of by assessors, whether non-residents or landlords, and enumerators might fail to obtain information from non-resident owners and landlords. Besides, and this is of more importance, it is probable that real estate owners would answer questions as to their mortgage debt to no public agent so readily as to assessors. It is not unreasonable to infer that enumerators would have failed to procure answers more largely than did the Michigan supervisors, especially in view of the almost complete failure of the Massachusetts enumerators in 1875, already referred to; and it cannot be doubted that were the collection of the statistics of the recorded indebtedness of individuals and of private corporations entrusted to the enumerators next June, not only would the remainder of their work be put in danger of failure, but there could be obtained no trustworthy or substantially complete statistics of this indebtedness of the people as a whole, and there would have to be omitted some very desirable statistics of private debt that will be obtained in another way.

Some things are unobtainable by statistical undertakings, human nature being what it is. The distribution of wealth cannot be directly determined by asking all the people

¹⁵ Computations made from the Michigan Census of 1884, Vol. 2, pages 6-58, and the Fifth Annual Report of the Bureau of Labor and Industrial Statistics of Michigan, pages 8-69.

how much they are severally worth ; and the fiat of law cannot accomplish this any more than it can make a piece of paper worth a hundred cents without a responsible promise to pay a hundred cents for it. Questions of debt are closely related to questions of wealth, and experience has shown that a large proportion of the people are still too sensitive to answer them for the love of science.

The Superintendent of Census has planned to gather a large amount of information regarding private debt. The scope of the investigation certainly includes all matters in securing which there is any reasonable hope of success. The inquiries will cover a wide subject, aside from individual farm and house holdings, and the facts will be obtained mostly from the records and, to a small extent, by inquiry of holders of mortgages and owners of mortgaged real estate. Subject to some qualification after the facts are all in hand, the following is a statement of the chief features of the results that will be obtained :—

The financial transactions of the people, as far as evidenced by mortgages, will be ascertained for the ten years 1880–89. The number of acres of agricultural land and the number of real estate holdings in villages and cities, which have been mortgaged in each year in each county, and the amount of mortgage debt placed upon these two classes of real estate, by years and by counties, will be ascertained.

The amount of mortgage debt existing January 1, 1890, and each of the several preceding years, upon agricultural land and upon village and city real estate, and the number of agricultural acres and of village and city holdings covered by this debt, will be obtained for each county.

It is impossible to discover the relationship between the amount of mortgage debt and the value of all mortgaged real estate except by averages. Of the agricultural land and its improvements, that are under mortgage, the proportion which the debt bears to the value can be ascertained only in

those states in which the statistics of taxation separate agricultural from other real estate, and in which a proportion may be obtained for corresponding village and city real estate.

It will be ascertained to what extent mortgages arise from misfortune, and for this purpose agricultural land will be distinguished from other real estate. There will be a reasonably minute analysis of the motives and objects for making mortgages as far as people are willing to disclose them. The rates of interest paid upon debts secured by real estate will be learned for each county and for each of the ten years, and the total annual interest charge will be computed. Private corporations, both as mortgagors and as mortgagees, will be kept distinct from individuals in these statistics as far as is desirable, and such corporations will be separated into several classes, according to the character of their business. The growth of the business of building and loan associations will be determined. A special feature of the investigation will be the discovery of the average duration of mortgage debt and the rapidity with which it is paid in part.

How far the facts that are to be obtained will show the number of mortgaged farms and homes cannot be told at this time, since the number of these can be reached only by computation, if at all. The amount of debt borne by agricultural land and the homes that go with it will be known, but in villages and cities, homes cannot be separated from other real estate.

In the collection of agricultural statistics by enumeration the number of tenant and proprietor farmers will be obtained.

The recorded indebtedness evidenced by judgments and chattel mortgages cannot be included in the investigation, because it would cost more than the work upon real estate mortgages, and there is no money for it in the appropriation.

A high degree of ability will be required for the field work upon mortgage indebtedness, and the Superintendent of Census must necessarily depend to a considerable extent upon experts sent out from the Census Office.

The difficulties in the way of this investigation have been and will be great, whatever form the inquiry may take. That the work could be done at all was for a long time doubtful, and it was only after the results of experimental investigation by three special agents in four counties had become known that it was possible to formulate a plan of work. All the information about the mortgage question, requested by numerous petitioners, that can be obtained without a house-to-house inquiry, will be brought out by expert investigation, except the numbers of tenant and proprietor farmers, and these will be procured by enumerators, as before stated. While it is impossible to comply with all suggestions, they will be substantially answered in some form or other, and in addition a vast amount of information not specifically petitioned for will be supplied.

CHAPTER III.

Some queries arise as to the interpretation of mortgage and farm and home statistics, which I only raise at present; and I am not to be considered as attempting to answer them, nor as expressing an opinion about the character of the answers.

A Western Kansas farmer borrows, in order that he may erect a barn and buy machines and tools; the soil and the weather then upset his plans and his crops fail. Did the mortgage cause his misfortune, or was it a miscalculation of the "bounty of Providence"? Again, by way of question, is a mortgage ever a cause of misfortune, except secondarily through the borrower's want of prescience or through his inability properly to manage the borrowed wealth?

In characterizing mortgages it is necessary to consider such cases as these: A loan is procured for the purpose of buying a lot; of building a dwelling house; of making improvements; of buying implements or machines to be used in the borrower's occupation; for the purpose of enlarging a manufacturer's product and extending his trade; to pay for a son's education; to pay grocery bills; to pay physicians' and undertakers' bills; to defend law suits; and for all the many uses to which money may be applied. If a paper manufacturer has found that his trade has grown faster than his product of paper, he may have borrowed \$80,000 with which to enlarge his manufacturing equipment. A decision must be made regarding the character of the business of building and loan associations. A merchant may have been compelled to borrow to replace losses of his capital through decreased business or bad debts.

If it should be found that 40 to 50 per cent of the mortgage debt of the people of a county was incurred to secure a portion of purchase money, 20 to 30 per cent to pay for improvements, and 20 per cent to increase trade and manufacture, what shall be said of mortgages? What if the county containing the most prosperous people in a state has also the largest per capita mortgage debt, or the largest ratio of debt to valuation? It has been thought that Jefferson county, Alabama, containing Birmingham, and Hampden county, Massachusetts, containing Springfield and Holyoke,—counties not excelled in their states for prosperity,—may have amounts and proportions of mortgage debt that would be startling if known.

No one who does not know something about the conditions that lead men to borrow can say what interpretations shall be given to mortgage debt. These questions of interpretation that have been raised may be answered in one way or another, perhaps in any one of half a dozen ways, when the facts are known; the object in raising them is simply to suggest that the general character of the facts are perhaps not commonly understood. Broader information, resting upon statistics and a more thorough analysis of the realities of mortgage debt, may qualify popular conclusions which it is now heresy to doubt. It is not asserted that further information will do this; but a caution is needed against making a conclusion and then going to work to find such facts as will sustain it. No investigation is scientific that does not canvass possibilities and provide for their discovery, if they may be found.

REVIEWS AND NOTICES.

AN ANNUAL CENSUS OF MANUFACTURES.

The Annual Statistics of Manufactures (Massachusetts), 1886, 1887. Boston, 1889. Pp. xix, 119.

The Annual Statistics of Manufactures, 1888. Boston, 1889. Pp. lxxxii, 147.

The decennial census of the Commonwealth of Massachusetts has ranked since 1875 as without a peer — save only the federal census — in the wealth and exactness of the data presented upon all phases of manufacturing enterprise. The large volumes devoted to this branch of inquiry in the censuses of 1875 and 1885 are crowded with tabulations and correlations, recording many details the statistical value of which is not always apparent, but presenting a picture of the industrial conditions, resources, and characteristics of the Commonwealth so complete as to bring them fully abreast of the requirements of the modern science of statistics. This work was organized under the direction of Hon. Carroll D. Wright, who is now utilizing with such admirable results to the nation and to statistical science, in the National Department of Labor, the experience and training which came to him as the head of the Massachusetts bureau. The latter has made, since Colonel Wright left it, a new departure in the investigation of the manufacturing resources of the state, the first fruits of which are the two volumes before us. This new departure is the result of Colonel Wright's experience with the decennial census of Massachusetts, and was authorized by law in response to his emphatic declarations that more practical and tangible benefits would accrue to the state from an annual census of industries, along certain lines, than were possible of attainment under the decennial system. The latter involved a great outlay of labor and money, was exceedingly irksome to manufacturers by reason of the difficulty of making the elaborate returns required by the law, and was robbed of much of its intrinsic value by the long delay which necessarily occurred in the publication of

results. Colonel Wright early detected another serious limitation in the decennial Industrial Census. Statistics of manufactures are chiefly valuable according to their adaptability for comparative deductions. Unless they possess this adaptability, they cease to afford an accurate measure of progress. Every element of uncertainty entering into the comparison correspondingly vitiates the conclusions it establishes. The ten-year period of inquiry necessarily involves an important element of variation, as was very clearly pointed out by Governor Robinson in his Message of 1886, in which he strongly urged that the decennial industrial census be superseded by an annual inquiry of more limited scope: —

“Censuses taken at intervals of ten years are liable to be quite inadequate for comparison, for the reason that one decade may end when our industries are in a flourishing condition, while the next may terminate in a year of great depression. Statistics are relied upon as of great value in scientific and economic inquiries, but they may be very misleading and insufficient to present the true conditions when collected only at long intervals.”

This is undoubtedly a well-founded criticism upon the decennial industrial census. At the same time it is to be borne in mind that the adoption of the ten-year period in respect to industrial development was natural and proper in association with the census of population. There is a great saving of expense by the prosecution of the two inquiries at the same time, and by machinery largely identical, and the association brings the best results in other ways. Each is in a sense the standard by which to measure the other. The best results for scientific purposes are obtained when we are enabled to view the growth of population and the growth of manufactures side by side. But the conditions that surround the two developments in successive decades are quite certain not to be identical, and at times the variation may be sufficiently marked to lead to conclusions altogether misleading. Something of this kind may happen in the Eleventh Federal Census, the preparations for which are now elaborately progressing. The Tenth Census showed a rate of growth in population from 1870 to 1880 of 23.4 per cent, and we have only to calculate the percentage of increase from 1880 to 1890, as it will soon be ascertained, to determine definitely by what percentage our growth of population in the latter decade has exceeded our rate of growth in the former. Very different conditions surround the industrial census. Industrial pros-

perity is periodic; and while it is historically true, as Professor W. Stanley Jevons and other economists have contended, that a "credit cycle," as it is called, will last about ten years, it is also historically true that these credit cycles do not recur at regular intervals, but may be accelerated or retarded by a thousand unforeseen circumstances which check or inflate the prosperity not only of states and of nations but of the whole civilized world. Thus it may happen, as suggested by Governor Robinson, that one industrial census may photograph a period of abnormal activity, and its successor one of unusual depression, thus destroying accurate correlations between the two. The Census of 1880 covered a year of unusual industrial activity. It revealed our manufacturing development at its high-water mark. Capital was bouyant, sympathetic, and aggressive. After a long period of commercial depression it had regained its courage, and all branches of industry were emitting a product nearly equal to the actual capacity in machinery. Necessarily the aggregate presented by the Tenth Census represented a tension of effort peculiar to the year of which it was the particular record, and not a safe criterion of the manufacturing achievements of the country for the years immediately preceding and following it. For there came subsequently a swing of the commercial pendulum in the other direction, followed by an era of idle wheels and smokeless chimneys in many departments of industry, and from which some at least have not yet sufficiently recovered to enable them to show in 1890 that ratio of increase which, when measured by the standard of increasing population, would be called normal.

Recognizing the full degree of this limitation upon the accuracy of the decennial industrial census, let us inquire if the annual census of manufactures, as proposed in Massachusetts and as carried out in these volumes, is a satisfactory substitute for it, and the best that can be devised. The decennial census, as Colonel Wright carried on those of 1875 and 1885, is a vast, complicated, and expensive undertaking. It was obviously impossible to accomplish every year a work of such magnitude. The Massachusetts legislature therefore passed a law in which provision was made for but 11 simple questions,—a very radical departure from the schedule of 1885, upon which there were no less than 193 interrogatories. It may be said here that the general schedule for manufactures which has been adopted for the Eleventh Federal Census contains but 27 interrogatories, and seeks to cover

but very little more ground, than is to be annually covered in Massachusetts hereafter,— but covering that ground fully. The Massachusetts decennial census was loaded down with a mass of queries asking information on points which, while interesting in themselves, were a hindrance in such an investigation as was originally contemplated in an industrial census.

In the utilization of his simplified schedule, Commissioner Wadlin has adopted a novel but very simple plan for taking what we may perhaps call a limited census of manufactures. He chose selected or typical establishments, an arbitrary number in each of the great industries, for the purpose of making comparisons between identical establishments making returns for each of the years it was desired to cover. In the tabular presentations of the first volume, direct comparisons are made between but 1,027 establishments, while in the second but 1,140 establishments are compared, being the total number which made returns for both 1887 and 1888. The total number from which returns are presented in 1888 is 3,517. Speaking of the comparative returns, Mr. Wadlin says that they are sufficient in number to be “indicative of the trend of business in each year,” and are therefore of “more scientific value than mere statements of aggregates.” The first of these statements may safely be accepted. It describes the purpose and defines the limitation upon the value of the annual census of Massachusetts manufactures. They are a barometer of the markets for the year to which they relate; and they are little else. They show whether the limited number of establishments to which they relate have increased or decreased their output of products, their consumption of raw material, their total running time, their number of employees, their average wages; and also whether they have been able to command prices for their products relatively greater or smaller than those obtained in the previous year. In the answer that is secured to the latter question will generally be found the genesis of the answer to all the previous propositions here stated. It is not to be disputed that the knowledge thus obtained is interesting and important. Whether it is within the proper function of an industrial census, and how fully it meets the purposes for which such an inquiry is supposed to be devised, are questions not unworthy of careful consideration. It is important also because so great is the popular regard for the example of Massachusetts in the matter of official statistics that the change she has inaugurated is not unlikely

to effect similar departures in other states; and the suggestion has already been made that the Massachusetts system shall hereafter be adopted in lieu of the present decennial census by the United States government of the industries of the whole country.

Commissioner Wadlin argues very ably in favor of the new departure. His argument is that the comparisons between identical establishments which his system permits are sufficiently comprehensive to allow of the results being accepted as typical of the actual present condition of all the important industries of the state. He justifies this contention by some figures which we repeat. No less than 23,431 establishments were reported in 1885, from which number, and all which have since been added, he presents returns in 1888 from but 3,517, or about 15 per cent of the whole number. Of these 23,431 establishments reported in 1885 a very large proportion cannot properly be considered manufacturing establishments, in Mr. Wadlin's judgment, because they include establishments carried on by persons engaged singly, or with but one or two employees, often members of their own household, and often for a portion of the year only. The bearing of this fact is strongly brought out by an analytical table of the value of all the goods manufactured in the state in 1885, from which it appears that of the total product of that year — \$674,634,269 — no less than 93.65 per cent, or manufactures to the value of \$631,822,681, was turned out by 6,757 establishments. In each of the remaining establishments the value of the manufactured product was less than \$10,000 per annum. By drawing the line at a product valued at \$20,000 or less, the number of establishments is reduced to 4,406, or 20 per cent of the whole number, and manufacturing a product worth \$600,000,000, or 88.96 per cent of the whole annual product of the state. From this data — which of itself is important — the Commissioner concludes that it is possible to show clearly the condition of the manufacturing industries by annual returns relatively few in number as compared with the whole number properly to be included in a complete census.

It may be conceded at once that the system thus outlined has a value, as applied to the state of Massachusetts, which would largely disappear if the attempt were made to apply it to the whole United States, or to the great majority of the individual states. Massachusetts is among the oldest of the manufacturing states. Her industries have developed along clearly defined lines, and have become largely

concentrated in great and overshadowing corporations or large firms of private ownership. Here, for instance, is Fall River, in which the Tenth Census reported 83 establishments making cotton goods of the annual value of \$14,510,007, as against 206 similar establishments in the whole state with a product valued at \$74,780,835. By taking the corporations of that single typical town and making a comparison from year to year of the amount of raw material they consume, of the value of the product they turn out, of the number of employees and volume of wages paid, certain definite results would be established as to the condition of cotton manufacturing in the state, which might be assumed to be applicable in the main to the rest of the cotton manufacturing establishments of Massachusetts. The state of the market for cotton goods from year to year would be as accurately determined by this group of returns as by returns from the whole 206. Any marked increase or decrease in the total production of cotton goods would thereby be indicated. If the Fall River mills have been running full time and to their full capacity, the fact will be established that the condition of trade throughout the whole country has been such as to make plenty of orders and show a general prosperity. Commissioner Wadlin's system, which is somewhat similar, accomplishes this result admirably.

On the other hand, acknowledging the merits of that system, let us look at some of its limitations. There is always the danger that a marked increase in the product of the mills employed in a particular industry may be due, however, to an increase in the productive capacity of a few mills, and not in any sense indicate a normal extension of that particular industry in the state. The cotton mills again will illustrate this.

The report for 1888 covers 112 establishments, compared for the three years 1886, 1887, and 1888. They show an increase of product from \$63,903,840 in 1886 to \$69,672,623 in 1887, or 9.03 per cent, and to \$74,062,954 in 1888, an increase of 6.30 per cent over 1887. It appears, however, that there was a decrease of capital in these mills between 1887 and 1888 from \$105,708,448 to \$101,843,238, equal to 3.66 per cent, but we are left without any means of determining how this phenomenon occurred. While it indicates a very healthy condition on the part of an uncertain portion of these 112 cotton mills, it leaves us in the dark as to certain other matters, for knowledge of which we can only turn to a census. We cannot

learn how many new cotton mills were established in the state during the year, or what their product was; how many old mills went out of existence; or, generally, the condition of the industry as a whole in comparison with any previous period. The decrease in capital hints at disaster in some quarters side by side with abnormal prosperity in others.

Thus it becomes plain that the matters of information necessarily omitted from this inquiry possess at least an equal degree of importance with those included. Nor is the comparative prosperity of the 4,500 establishments which did 80 per cent of the manufacturing of Massachusetts in 1888, in our judgment, so accurate a test of the growth of the productive industries of the state as is that of the 18,000 to 20,000 establishments which are obliterated from the record. It is the increase or decrease in the number and the product of these smaller establishments which affords the true criterion of the actual condition of the Commonwealth, and of the relative prosperity of the greatest number of her people.

It may be said in answer that the prosperity or depression of the smaller establishments of productive industry may be correctly inferred from the ascertained condition of the larger industries which are made to stand as typical. The soundness of this answer can be conceded only within the narrowest limits. Such inferences are more than likely to be misleading. The most interesting phase of the current industrial development of the United States relates to the tendency of capital to concentration in large manufacturing establishments. The annual census is worthless as an aid in determining the effect upon the state at large of this predominating characteristic of concentration. Moreover, any attempt to apply this annual system to the country at large would be even more strikingly deficient in the attributes which now attach to the decennial federal census of industry.

A peculiar feature of the development of American manufactures is the sudden and enormous up-growing of distinct industries in localities that have not previously contained them. There are wonderful illustrations of this characteristic all through the Middle-Western states, and even older communities, like New York and Philadelphia, are full of them. The system of limited or typical statistics adopted in Massachusetts could take no proper cognizance of these growths, nor afford an accurate insight into the conditions of industrial enterprise in the states containing them.

The large, perfectly equipped, and thoroughly organized establishments which run on from year to year, with little change in their output, piling up stock or taking orders in advance of their capacity to manufacture, accordingly as the market is favorable or otherwise, do not afford trustworthy data by which to determine the question whether the manufacturing interests of a state as a whole are increasing or declining. It is the comparative statistics of the 18,000 or 20,000 establishments which these reports ignore which tell the true story.

The true remedy for the defect in the industrial census which Governor Robinson pointed out is to make it a quinquennial inquiry, extended to every interest, but limited in the scope and character of the questions asked and tabulated. Censuses taken at intervals of five years would preserve, as a rule, a fair equilibrium between the periods of business expansion and depression; and they could be made so simple in their scope as to permit of early publication. All the mass of special information with which the Massachusetts decennial census has been encumbered might well be relegated to the system of inquiry as to typical establishments. But beyond that we are confident that Massachusetts will in time become convinced that it is a mistake to abandon an industrial census that reaches the humblest as well as the greatest of her industrial enterprises.

S. N. D. NORTH.

VOTING STATISTICS.

Under the title "*Did the Fathers Vote?*" Professor J. Franklin Jameson of Brown University contributes to the January number of the *New England Magazine* an article on the voting habits of one hundred years ago, especially in Massachusetts. After showing that, for heavy and steady voting, among all countries of the present time the palm probably belongs to the United States, he proceeds to investigate the question, whether this decided habit of voting was equally characteristic of the generation which founded the Republic, an inquiry of some importance, "for, with every allowance for differences of circumstance, it must in general be affirmed that habitual heavy voting is proof of strong and widely-diffused public spirit, while a constantly light vote indicates political apathy and individualism."

During the years from 1776 to 1789, the period to which the investigation is mostly confined, the electoral qualification in Massachusetts consisted of a freehold estate of forty shillings sterling per annum or other estate to the value of forty pounds. The polls, or males of above sixteen years of age, then numbered 24 per cent of the population; the number of males over twenty-one must therefore have amounted to about 20 per cent. A considerable deduction must be made from this figure for the adult sons of freeholders. One-sixth of the adult native males in Massachusetts at the present time are the sons of living Massachusetts fathers. It is not necessary to deduct one-sixth, however, for doubtless many such sons, if they did not yet have freeholds, had other estate of the value of forty pounds. A reduction from 20 to 18 is considered sufficient for this cause. From a consideration of the value of farming lands and of the extensiveness of freehold proprietorship Professor Jameson concludes that the number of those excluded for lack of the necessary property was not very large. He estimates that about 16 per cent of the population could vote. A few instances, in individual towns, of votes actually approaching that figure show that it cannot be set much lower.

In March, 1778, the citizens voted on a draft of a constitution; in 1779 they voted on the question of having a new form of government; in 1780 they voted as to the acceptance of the constitution framed that year. In each case the total vote cast amounted to but about five per cent of the population. In 1780, the people began voting for governor and lieutenant-governor. From this time on, therefore, we have more complete data. From 1781 to 1786 the vote was of but two per cent of the population. Shays' Rebellion and the constitutional discussions brought it up to five in the next three elections. Then it sank to between three and four, and there remained till 1794 and the disputes engendered by the French Revolution. Further evidence of indifference and imperfect political development is derived from the figures for different candidates; hardly any election was closely contested. The lightest vote was cast in Maine, which now votes so heavily. There was much more difference between counties, in respect to voting habits, then than now. The western counties, and three in the Old Colony, had about the same rank as now; the rest, curiously enough, now stand in exactly the reverse order to that of 1780-1789. Since the thinly-settled districts did more voting than the populous towns, the failure to vote cannot have been mainly due

to sparseness of settlement and consequent difficulty of reaching the polls. Professor Jameson adds a few facts which, so far as they go, show that voting habits in the other states were in a similar stage.

HUBNER'S GEOGRAPHISCH-STATISTISCHE TABELLEN.

Otto Hübner's Geographisch-statistische Tabellen für 1889. Edited by Prof. Fr. v. Jüraschek.

This is one of the most compact and satisfactory reference hand books published, although confined to most elementary statistical data for all lands. Its popularity in Germany is well deserved, and it is now in its 38th year. Two editions are published annually, one in the form of a book in size about 6 by 4 inches of about 50 pages, the other as a single sheet of 30 by 40 inches, intended for the walls of offices and school rooms. The single sheet is an abstract of the book, and does not contain all of the data found in the latter. Common to both editions is information for each state upon the following matters: Form of government and present head of it, area, population, public revenue, expenditure and debt, army and navy, merchant marine, exports and imports, length of railroad and telegraph lines, coins, measures of weight, length surface and volume, chief articles of export, and, finally, the capital and chief cities. The book edition gives in its general tables facts as to emigration, nationality, and religious belief, besides which it contains some special tables. These are a table of some of the more common statistical ratios, and also the population, the religions and races of the earth, the nationalities and religions of Europe. The list of authorities which precedes the tables is a very complete statement of the sources of information which will be appreciated by the statistician.

Throughout, the latest obtainable figures are given, and everywhere the year to which they refer is indicated, so that the information is exact as far as it goes. The compilation bears the stamp of accuracy, and the name and position of the editor, who is a member of the Austrian Central Statistical Commission, furnish a guaranty for the character of the work. The matter is so well arranged and so easily found that those who have used the publication in either form are unwilling to be without it.

R. P. F.

TWO STATISTICAL ATLASES.

The Statistical Atlas of Commercial Geography. By E. J. Hastings. W. & A. K. Johnston, Edinburgh and London. 167 pp.

Extended notices of no less than three commercial geographies of more recent date than the above having appeared in former issues of these Publications, there may seem to be some apology needed for calling attention to the work of Mr. Hastings. It may, however, claim our attention by its exclusively statistical methods. The author deals in diagrams and tables, and has no text whatever. His facts gathered from the Blue Books relate to the exports and imports of Great Britain, with four exceptions, for the year 1886, and the exports of other countries for 1885. Imports in general are presented according to different classes of commodities, then again as coming from twelve British possessions, and from twelve principal foreign countries. Then follow for thirty specified commodities statements of the relative value imported from different countries. The total exports from Great Britain are treated in a similar fashion, and a presentation made of the chief articles of export of thirty-four foreign countries. Interspersed with the rest are a half dozen statements of the production of certain articles of commerce in the chief centres of production in England.

The information is presented in diagrams and tables, the latter usually facing the former. The diagrams are all of one style. A certain square is taken as a unit and these are placed one above the other, showing a thin white line between each square and the next. The result is in most cases a series of broad vertical lines easily compared. When, however, the sums are large the amount has to be shown by two or more such lines, and here the comparison involving two dimensions is not so easily made at first glance. Apart from this minor matter the book is a decidedly successful attempt at the presentation of the main facts of imports and exports of interest to the British public by graphical methods.

R. P. F.

Album of Agricultural Statistics of the United States. Department of Agriculture. Results of investigation under direction of the Statistician. Washington, D. C., 1889. Quarto. Pp. 8; plates 16.

This publication is the result of a petition for a small separate allowance for graphic illustration. The list of illustrations relates to

percentages of unoccupied and of farm lands; acreage and yield in corn, wheat, and oats; average value of horses, cattle, sheep, swine; percentage of rural population, average value of land, farm tenures, etc. They are based upon special investigations of the Department. The maps are neatly executed. Various methods of graphic illustrations are introduced, some of them new to American statistics, although used in the French Albums. The grading of the tints is especially good. It is to be wished that dates were assigned to the several maps, for there is no clue to the exact period to which the representations refer.

D. R. D.

COMPARATIVE STATISTICS OF SPRINGFIELD CHURCHES.

Second Annual Report of the Eastern Avenue Congregational Church together with comparative statistics of the Springfield churches for fifty years. Springfield, Mass., Oct., 1889. Pp. 20.

The publication of the comparative statistics collected in this brief pamphlet should stimulate churches in other cities to initiate similar work. It is of great social interest, and there does not appear to be any reason why in most cases such an inquiry cannot be satisfactorily accomplished. Statistics are presented showing the relative growth of churches and membership of the different denominations in Springfield for half a century. The following table shows the ratio of churches and the evangelical communicants to the population during fifty years:—

	1840.	1850.	1860.	1870.	1880.	1889.
Population of Springfield.....	6,461	11,776	15,199	26,703	33,340	43,654
One Protestant church to every.....	810	980	1,013	1,406	1,516	1,455
One Evangelical church to every.....	1,080	1,176	1,267	1,669	1,775	1,617
One Non-Evangelical church to every..	3,241	3,883	5,066	8,901	11,113	14,551
One Roman Catholic church to every..	....	11,766	15,199	13,352	6,868	8,731
One Christian church to every.....	810	905	950	1,271	1,235	1,247
One Evangelical communicant to every	5.32	6.37	6.32	6.73	5.48	5.35
Average membership of Evangelical churches.....	204	185	200	249	320	302

This table shows that in Springfield the number of churches compared with the population is steadily diminishing. The ratio, how-

ever, has to be modified by the statistics as to membership. A church now averages 302 communicants while in 1840 the average was 240. In 1840 only one church out of eight had a seating capacity of 700 or over; now 17 out of 35 are thus equipped.

"The truth can be reached more accurately by a comparison of Evangelical communicants. Fifty years ago there was one to every 5.32 persons, now one to every 5.35, almost identically the same." The church capacity appears to be 53 per cent of the population.

RECENT INDUSTRIAL REPORTS.

Third Annual Report of the Factory Inspectors of the State of New York, for the year ending December 1, 1888. Albany, 1889. Pp. 461.

In addition to the reports of inspections, this contains a tabulated list of more than 600 accidents to employees occurring in industrial establishments in New York during 1888. The cause of the accident as given by the manufacturers, and the extent of the injury, is stated. In the Appendix is published the inspection laws not only of Massachusetts, Connecticut, Maine, New Jersey, Ohio, Rhode Island, and Wisconsin, but also of England, France, Germany, and the Province of Ontario. The report of the second annual convention of the National Association of Factory Inspectors of North America is appended.

Report of the Massachusetts District Police for the year ending December 31, 1889, including the inspection department and the detective department. Boston, 1890. Pp. 464.

This is the eleventh annual report of Rufus R. Wade, Chief of District Police. The operations of the District Police in Massachusetts cover a wide range. The force comprises 33 men, of whom 20 are detailed for the inspection department, and 12 for detective work. The inspection work during the past year related particularly to elevators, child labor in factories, fire escapes, and sanitation and ventilation in public buildings and school houses. It is estimated that about eighty per cent of children between the ages of ten and fourteen years, formerly found in manufacturing establishments, are now regularly at school. The report in regard to condition and proper

sanitation of school houses is special and complete; it covers about half the volume. Many plates and diagrams of various systems of ventilation are inserted. In the summary of inspection work it appears that 2,425 manufacturing, mercantile, and public buildings, hotels, tenement and apartment houses were inspected in 1889. Changes were ordered in 1,547 cases.

The Chief of District Police by law also receives all liquors forfeited in the several towns of the state. One table shows the number of seizures, and the amount in gallons of malt and spirituous liquor. The average returns per seizure does not vary much during the successive years.

Annual (Fourth) Report of the State Board of Arbitration for the Year 1889. Boston, 1890. Pp. 68.

This contains reports of twenty-six of the more important cases in which the Massachusetts Board acted in 1889. It is estimated that the yearly earnings of the operatives directly involved in the controversies dealt with by the Board were \$3,684,000, and that the total yearly earnings in all departments of the factories involved amount to \$10,162,000.

MINOR NOTICES.

Third Annual Report of the Interstate Commerce Commission. December 1, 1889. Washington, 1889. Pp. 463.

The report contains little statistical material, as this is now made a part of the annual report of the statistician, published separately. Among the appendixes are the following:—

Railway methods of keeping freight accounts.

Statement of Canadian railways.

Federal regulation of safety appliances.

Relations existing between railway corporations and employees.

Railroads in foreign countries.

There is also published the result of an inquiry in regard to railway consolidation, and the adoption of weaker lines by stronger ones. It is shown that this tendency of capital aggregation is not due to the operations of the interstate commerce act. It is also shown that the proportion of combinations was greater before than after the act.

CONSOLIDATIONS, ETC. TO DEC. 31, 1889, OF ROADS THAT WERE OPERATING COMPANIES ON JUNE 30, 1880.

How Acquired.	1880	1881	1882	1883	1884	1885	1886	1887	1888
Consolidated, absorbed, and merged.....	33	53	11	9	7	5	9	9	7
Controlled, leased, and operated.....	69	28	40	22	12	23	12	15	21
Purchased.....	13	8	3	5	1	2	2	2	4
Total.....	115	89	54	36	20	30	23	26	33
Re-organizations and changes in name.....	7	7	4	3	5	5	12	11	3

Special tables are also printed showing the growth of the Pennsylvania R. R. and of the Chicago & Northwestern R. R.

Annual Report of the Secretary of the Treasury on the state of the Finances for the year 1889. Washington, 1889. Pp. clxi, 964.

In this volume are published the reports of the Secretary of the Treasury and of heads of Bureaus, etc. Few new statistical tables are added. The Treasurer once more, pages 5-8, discusses the method of estimating the public debt. From the accounts of the New York custom house it is estimated that public receipts now consist substantially altogether of legal tender notes and gold certificates, the proportion of other moneys having been less in 1888-89 than in any previous one since the record was kept. The report contains a history of the civil service examinations in the Treasury Department.

Annual Report of the Comptroller of the Currency of the United States, December 2, 1889. E. S. Lacey, Comptroller. Pp. ii, 305.

This contains the usual information and tables in regard to the national banking system. A special interest attaches to the continued attempts made by this Bureau to tabulate the operations of the state banks of various nature. Some advance has been made since the report of 1888. Statements are now tabulated in regard to 3,964 state banks, loan and trust companies, and savings and private banks against 3,527 similar institutions in 1888. For the first time it has been possible to include reports of savings banks in West Virginia, Alabama, Texas, Tennessee, Wisconsin, and Dakota. In South Carolina, Ohio, and Illinois there has been a decrease in the deposits, although it would appear that the deposits in Ohio in 1888 were abnormal. In Illinois the decrease has been steady since 1886. The most marked relative increase has been in California and Pennsylvania.

Bureau of Education Circular of Information, No. 1. 1890. The History of Federal and State Aid to Higher Education in the United States. By Frank W. Blackmer, Ph.D. Washington, 1890. Pp. 343.

Contains in the Appendix a table showing by states the value of unproductive property of state colleges and universities; value of productive property; annual income; permanent state endowments; total state appropriations for higher education, and the amount of assessed valuation of the property.

Cotton Facts. A compilation from official and reliable sources of the crops, receipts of exports, stocks, home and foreign consumption, visible supply, prices, and averages of cotton for a series of years. By Alfred B. Shepperson. New York, 1889. Pp. 75. Price, 75 cents.

This is the thirteenth issue of a very convenient and handy volume of statistics of the cotton trade. New tables have been added.

MISCELLANY.

STATISTICS OF CHRISTIAN NAMES IN EARLY TIMES.

The following extract is taken from *The Academy*, Feb. 1, 1890.

The elaborate indexes to the *Register of the University of Oxford*, 1571 to 1622, compiled by Mr. Andrew Clark (Oxford Historical Society, 1889), include a table of Christian names, in which is set out the number of times that each occurs. The total of names given in this portion of the *Register* amounts to about 30,000, and must undoubtedly be—as Mr. Clark calls it—“more representative of English names, for the years over which it extends, than any list yet published.”

The following are the twelve most common Christian names, each occurring (approximately) more than once in every hundred out of the total of 30,000:—

John,	3826	times,	or about	12.8	per cent.
Thomas,	2777	“	“	9.3	“
William,	2546	“	“	8.5	“
Richard,	1691	“	“	5.6	“
Robert,	1222	“	“	4.1	“
Edward,	957	“	“	3.2	“
Henry,	908	“	“	3.0	“
George,	647	“	“	2.2	“
Francis,	447	“	“	1.5	“
James,	424	“	“	1.4	“
Nicholas,	326	“	“	1.1	“
Edmund,	298	“	“	1.0	“

The following thirty-one Christian names each occur more than fifty times: Anthony (262), Hugh (257), Christopher (243), Samuel (227), Walter (207), Roger (195), Ralph (182), Peter (175), Humphrey (168), Charles (139), Philip (137), David (129), Matthew (116), Michael (103), Alexander (98), Arthur (98), Laurence (90), Giles (88), Stephen (86), Simon (83), Daniel (79), Lewis (78), Joseph (78), Andrew (69), Roland (65), Evan (55), Abraham (54), Leonard (54), Owen (53), Gilbert (52), Morris (51).

In comparison with this list, the following passage from the Preface to Mr. T. F. Kirby's *Winchester Scholars* (Henry Frowde, 1888) seems worthy of quotation, premising that the Winchester list not only comprises a much earlier period, but is also drawn almost exclusively from the South of England. For the two centuries referred to the total number of entries would be about 3,700.

"Of the Christian names occurring in the first two hundred years (1393-1592) John is by far the most common. It occurs more than 1060 times, and was borne by nearly one out of every three boys admitted during that period. William, the next in point of frequency, occurs more than 560 times, Thomas more than 500 times, Richard about 390 times, Robert about 250 times, and then the following names arranged in order of frequency: Henry, Edward, Nicholas, George (chiefly in the latter part of the period), Edmund, Walter, Roger, Christopher, Antony, Simon, James, Francis, Peter, Philip, Matthew, Michael, Alexander, Geoffrey, Giles, Arthur, Humphrey, Charles (chiefly in the latter part of the period)."

CENSUS OF THE ELECTRICAL INDUSTRY.

At the February meeting (1890) of the National Electric Light Association, held at Kansas City, resolutions were passed favoring the extension of the investigation of the electrical industry by the United States Census office. The following is a portion of the resolutions:—

Be it Resolved, by the National Electric Light Association, in convention assembled,

First. That it respectfully petitions the Senate and House of Representatives of the United States Congress to authorize and direct the superintendent of census to collect the following data in relation to the electrical industry, in addition to the general statistics of manufactures already provided for by law.

(a) Details pertaining to underground and aerial construction, underground and aerial currents, the character and voltage of all currents and their uses; lamps in use, arc and incandescent, and how wired for residence, commercial, and municipal service; motors for use for stationary service and motor cars, income and expenses, etc.

(b) An inquiry through sources independent of those interested in the industry, as to the casualties resulting from the use of electric currents, both as to fire and personal injuries. This investigation to be made in all cities of 10,000 population and over. The information to be obtained from underwriters, the records of fire departments, coroners' statistics, health boards or commissioners, or from whatever source of information that may exist in any city. The investigation to make a comparative statement between the casualties resulting from the use of electric currents and the use of other agents employed for similar purposes.

Second. That we hereby petition that an appropriation of not exceeding \$50,000 be made for the purpose of this investigation.

MORTGAGES IN FOREIGN COUNTRIES.

Reports from the Consuls of the United States. Nos. 110 and 111. November and December, 1889. Department of State. Washington, 1890. Pp. 387-375.

The above report contains the replies of the Consuls to the interrogatories originally propounded by the National Board of Trade in 1888 in regard to mortgage indebtedness. The following list of questions indicates the scope of the reports :—

- (1) What systems of recorded indebtedness, such as mortgages on real and chattel property, liens, and judgments; both decreed and confessed, prevail in your consular district?
- (2) Are liens placed on personal property, including crops, either by preference or confession of judgment, and is such property subject to execution of judgment? If so, are there any exemptions?
- (3) What probable ratio do mortgages and judgments bear to total valuation of taxable and assessed property?
- (4) Is it required that all mortgages be recorded?
- (5) What is the prevailing rate of interest on mortgage paper as well as judgments?
- (6) Do mortgages complicate or embarrass the transfer of land titles?
- (7) Are mortgages foreclosed by action at law or by sale under power, and at what expense?
- (8) Is recorded indebtedness increasing or diminishing in proportion to estimated value?
- (9) What provisions are made for partial payments on mortgages, obligations or judgments, viz., Must partial payments be recorded and does the debtor lose all benefit if he defaults in part?
- (10) What is the ordinary form for cancelling?
- (11) Is it possible to arrive at a probable proportion of existing recorded and unrecorded indebtedness? If so, how?

In a few of the countries there are statistics showing the ratio of mortgages to total valuation. Generally it is confessed that no means exist by which such an estimate can be made.

EXAMPLES OF STATISTICAL FALLACIES.

The longevity shown by annuitants as compared with life policy-holders is frequently a matter of comment. This is explained on the principle that it is for the most part only people who feel satisfied that they have an excellent chance of a lengthy existence who consider it worth while to purchase annuities. The report of the directors of the Friends' Provident Institution contains a good example of the disparity between the ages at death of life policy-holders and annuitants. The average age of 62 policy-holders whose lives fell in was 64 years and 8 months, whilst the average age of the 14 annuitants was 79 years and 2 months. Annuitants, therefore, do not quite live for ever, as some persons have been jocularly led to affirm, but evidently their chance of attaining a patriarchal age is a very good one.—*Commercial World*, London.

The statistics for the State Board of Health for the past year show a much smaller per cent of mortality from old age in this city than in the state at large. This, according to a newspaper view, proves the conditions more favorable here to old age. It proves nothing of the kind. The simple fact is that there are proportionately fewer people of old age here to die, and the inference is directly the reverse of that which was drawn. We note the matter as illustrating how easy it is to draw wrong conclusions from statistics. The tables alluded to do show a higher mortality in the cities than in the country at large.—*The Insurance Monitor*, New York.

The main point in a comparison is the point of view. For example, as regards the proportion of their populations enrolled in school, Massachusetts and South Carolina are on an equality. Mississippi outranks them both, while Florida, Tennessee, and West Virginia take the palm from all the North Atlantic States.

But what of that? There be populations, and populations! A mining state, like Nevada, may have every resident child at school, and yet make no show in such a comparison, for the simple reason that the ratio of children to adults is far below the normal ratio. In the North Atlantic States, as is well known, the relative number of children is so much less than in any other group east of the Rockies that, to equalize the prospect, where Massachusetts has seven children at school, each of the Southern States named should have eleven; hence, as a point of view in the discussion of school attendance, total population is a failure.—*Independent*.

AMERICAN STATISTICAL ASSOCIATION.

NEW SERIES, No. 10.

JUNE, 1890.

Read before the AMERICAN STATISTICAL ASSOCIATION, May 9, 1890.

THE STUDY OF STATISTICS IN ITALIAN UNIVERSITIES.

BY CARROLL D. WRIGHT.

At the joint session of the American Economic Association and the American Historical Association at Cambridge, in May, 1887, I had the honor to read a paper on "The Study of Statistics in Colleges." I was fortunate enough to be able to present at that time the programmes of some of the universities in Europe, but I had not been able to secure the line of work carried on in Italian institutions of learning. Through the courtesy of Signor Bodio, of the Department of Agriculture and Commerce at Rome, I have been able to collect information relating to Italy, and feeling that this information ought to be put in permanent form, that our own colleges and universities may have the benefit of it, I have been glad to present it to the American Statistical Association, that it may become a part of its public work.

Not only is the science of statistics taught in the universities of Italy, but it is taught also in every one of the technical institutes of the country, about eighty in number. These institutes correspond to the *Höheren Realschulen* of Ger-

many, and to the *Enseignement Secondaire Special* of France. It is an obligatory study for the law students in the universities, and it must include the theory of statistics and the statistics of the kingdom. The professors of the universities are free, however, as regards the lessons they may offer, and they are accustomed to develop in each year those parts of their respective programmes which they think most convenient. The programmes of the courses of the most learned of the professors of statistics, namely, Senator Messedaglia, of the University of Rome, and Senator Boccardo, formerly Professor of the University of Genoa, and now Consigliere di Stato, for the academic year 1888-89, and of Prof. Carlo F. Ferraris, of the University of Padua, were as follows:—

COURSE OF STATISTICS

HELD BY PROF. A. MESSADAGLIA (SENATOR OF THE KINGDOM) IN THE UNIVERSITY OF ROME.

A. THEORY OF STATISTICS.

- I. General idea of statistics and its conception as a social science.
- II. Origin and historic development of statistical science. Double order of inquiries and studies: Historical-political, and mathematical. Statistics as now understood.
- III. Analysis of the knowledge of statistics.
 1. Object of statistics. Nature and conditions of the statistical data.
 2. Action and aim of statistics. Results, laws, casual relations; research and determination of the above topics. Nature and character of the statistical laws. Classification of the causes. Law of the accidental causes properly called.
 3. The method. Logical characters of the statistical method properly considered. Its general application to the sciences of observation.
- IV. Limits of statistics and its affinity with other sciences. Mathematics as an auxiliary science of statistics.

V. Present increasing importance of statistics.

1. Considered scientifically and as aiding other sciences.
2. Practically considered, in the ordinary contingencies of social life.

VI. Means and process of compiling statistics.

1. Gathering of the data. Several methods for this topic.
2. Criticising of the data.
3. Elaboration of the data.
 - a. Technical or material.
 - b. Logical or scientific.
4. Tabulation and publication of the results.

VII. General rules for the discussion and application of the statistical data.

Special study of the law of great numbers.

VIII. Study on the comparability of the data. General conditions of comparability and process of reduction necessary to render the data as comparable as possible.

Particular applications to demographic, commercial, and financial statistics.

Examination and comparison of Italian, French, and English budgets, or financial statements from the standpoint of their comparability.

IX. Mathematical methods, both analytical and geometrical, which find their application in statistics.

The theory of the probability. Errors of observation. Empirical attainment. Geometrical constructions, or drawing as a way to represent and discuss the data.

X. General partition of statistics.

1. Territory and climate.
2. Population (Demography).
3. Vitality.
4. Economical and social conditions.
5. Intellectual conditions.
6. Moral conditions.
7. Political conditions.

A synthetic résumé of the several data which represent the social life of the country.

B. STATISTICS OF THE KINGDOM.

These are treated according to the data at hand, and always in the form of comparison, confronting province with province, when treating of home statistics, and Italy with other nations, when making international comparisons.

The method of instruction is usually by monographs upon different subjects, as, for example, population, criminal statistics, finances, etc., seeking to treat each as exhaustively and interestingly as possible. Thus, in the University of Rome, in the past scholastic year 1888-89, the programme of the statistics of population or demography included the following general inquiries:—

I. Population considered in its present condition. Corresponding statistical documents. General census as taken periodically. Other documents relative to it.

1. Absolute population, or considered only in its number, as a matter of fact. Actual and legal population.
2. Relative population, or in relation to the extent of the territory. Density. Map showing the distribution of the Italian population, according to the territorial extent. Centred and scattered population. Economical and social importance of the results of the above data.
3. Specific population.
 - a. Sex.
 - b. Civil condition (single, married, widowed).
 - c. Age. Economical and social importance of this inquiry. Difficulty in ascertaining it with accuracy; and relative corrections of the same.
Distribution by age in relation to births, deaths, and to the stationary or progressive condition of population.
Special comparisons with foreign countries. United States of America, France, Italy.
 - d. Nationality. Ethnographical statistics of Europe.
 - e. Religion. Religious statistics of Europe.

- f.* Trades and occupations. Methods and ways of obtaining the above data. International comparisons.
 - g.* Property-holders.
 - h.* Instruction.
 - i.* Political condition.
 - k.* Physical defects. Anthropometrical data.
- II. Population considered in its movement. Corresponding statistical documents.
- 1. Intrinsic movement (natural reproductive power).
 - a.* Marriages.
 - b.* Births.
 - c.* Deaths.

Each one of these topics studied in all its interesting aspects and in a comparative form.
 - 2. Extrinsic movement (social, migratory changes). Emigration and immigration.
- III. Statistical laws of the movement (Bionomy) in relation to the general economical conditions of population.
- IV. Measure of vitality (Biometry). Tables of mortality and of surviving. Average life and probable life. Methods of constructing the above data.

COURSE OF STATISTICS

HELD BY PROF. G. BOCCARDO (SENATOR OF THE KINGDOM) IN THE UNIVERSITY OF GENOA.

- 1. Statistics as an art and as a science. Its historic evolution. Its relations with the other social sciences, more especially with the political economy.
- 2. The methods of research and those of exposition.
- 3. The law of great numbers. The means, averages, and median values. The statistical probability and prevision.
- 4. Distribution of the statistical researches.
 - a.* Residence of people (territory, climate, etc.).
 - b.* People.
 - c.* Institutions of the people (government, religion, administration, etc.).

5. The statistics of the people (Demography) is more proper than any other part of the statistical research to be scientifically treated: reasons of that. Therefore, it is selected as the subject of the course.
6. Chief division of demography. Static and dynamic.
7. The practical basis of the static demography. The census. History and technics of the census. Comparative data.
8. The practical basis of the dynamic demography. The registers of the civil state. The theoretic population.
9. Nativity. Births of different sexes in time and space.
10. Mortality. Tables of mortality, and methods of their formation. Average age. Average life. Probability of life. Accidental death. Military death.
11. Marriage. Celibacy. Widowhood.
12. Emigration. Its different sorts. Its statistical and social effects.
13. The social classes. The professions. Property. Pauperism.

STATISTICS.

PROGRAMME OF LESSONS

BY PROF. CARLO F. FERRARIS, UNIVERSITY OF PADUA, ITALY.

INTRODUCTION.

- I. Definitions of statistics.
- II. Their theoretical divisions.
- III. Their history.

PART I.* THEORY OF STATISTICS.

1. Statistics as an auxiliary method of induction. The analysis of facts with regard to their quality as a preliminary operation.
2. The collection of facts expressed in numbers.
3. The grouping of numbers. Notion of statistical quantities and series.
4. Elaboration of numbers. General notions, especially of the mathematical theories of application in statistics.
5. Elaboration of numbers (continued). Relative frequency of facts; proportional values.

* This part is fully treated every year.

6. Elaboration of numbers (continued). Averages.
7. Elaboration of numbers (continued). Some special and the most interesting applications of probability to social facts.
8. Interpretation of numbers. Regularity in phenomena and the law of causation.
9. Interpretation of numbers (continued). The logical methods for singling out the causes.
10. General results of statistical inquiry. Statistical laws.
11. Auxiliary operations in statistics and graphical figurations.

PART II. IMPORTANT QUESTIONS IN TECHNICAL STATISTICS.*

1. General census of population.
2. Special census of professions.
3. Registration of marriages, births and death, life tables, immigration and emigration.
4. Criminal statistics.
5. Statistics of economics, especially *a*, of money; *b*, of prices; *c*, of wages; *d*, of transports; *e*, of international trade.
6. Financial statistics.
7. Organization of official statistics.

PART III.† DESCRIPTIVE AND INQUIRING STATISTICS.

INTRODUCTION.

Notion of the social subjects, which may be the object of statistical description and inquiry.

1. The distribution of population on the country and its composition according to age, sex, and condition as to marriage (family condition, *stato civile*).
2. Marriages and births.
3. Migrations.
4. Wealth.
5. Intellectual culture.
6. The state and its forces.
7. Professions.

* Choice was made observing that statistics is explained to the students of the faculty of law and political science. Owing, however, to the shortness of the academic year, it is impossible to treat fully the matter in this and the following part every year.

† See the preceding note.

8. Criminality.
9. Biometry and mortality.
10. Law of population.

As regards the general methods of inquiry, the comparative form is always followed, and even in the theoretical part each rule is illustrated by examples and comparisons of facts; so also as regards the history of statistics, which is exemplified by particular references to some economical topics, as, for instance, to the general census of population. The general history of statistics in the Italian universities is often treated separately, as a part of a theoretical course, as has been done by Prof. Gabaglio, at the University of Pavia, in his well-known treatise.

The pamphlets of Prof. Messedaglia, "*Storia dei metalli preziosi*," "*La moneta*," "*I valori medi*," "*Statistica teorica ed italiana*," and "*La scienza statistica*," and Prof. Gabaglio's work, "*Teoria generale della statistica*," indicate most thoroughly the important position held by statistical science among Italian officials and educators, and the progress achieved in teaching that science in the Italian schools of superior instruction. The grand position indicated by the programmes given and the works cited is the direct outcome of the wonderful progress which the Italian government has made in the collection and presentation of statistical information. In the official statistics of Italy Signor Bodio has led the way, and the constant and rapid publication of statistical works of the very highest value, covering almost every important feature of social and industrial life, offer examples for other countries.

While much of the work in the Italian schools may be easily obtained from the yearly Reports of Commerce and Industries of Italy and other countries, it will be seen from the programmes that in Italy much importance is given to the methods and history of statistics, and that as regards the application of statistical science great stress is laid upon its demographical and moral aspects.

It is only recently that Sig. Egisto Rossi, well and personally known to members of our association, published a work on public instruction in the United States, entitled "*La istruzione pubblica negli Stati Uniti*," for the benefit of the Italian people. I am not aware that anywhere, in the English language, is there so complete and so compact a statement of all the important features of public instruction in the United States. This is only an instance of the efficiency and the wide-reaching efforts of the Italian government in placing before its people the results of research. Augmenting this official work with the very best methods of teaching statistical science, not only in the universities, but in the technical institutes, Italy is making strides in statistical science that may well excite our admiration and stimulate our emulation.

STATISTICS OF PRIVATE CORPORATIONS.

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The rapid growth of private corporations is one of the striking features of the present industrial development. More prominent perhaps in the United States than elsewhere, it is nevertheless to be observed in all countries which have felt the spur of recent industrial progress. It has been accepted here as a necessary concomitant of modern methods of doing business, and there has been little disposition to object to the principle of stock companies or corporations. Certain forms of corporations have at various times been the target of hostile legislation, but in general the tenor of our laws has been favorable to the growth of corporations. It cannot be our purpose to review here the legislation on the subject. We can only note the fact that legislation on the subject of the foundation and conduct of corporative enterprises has been rather lax, and that very few guarantees in the interest of the public have been required. Or, to state the proposition inversely, very few hindrances have, at least since the passage of general incorporation laws, been placed in the way of persons desiring to secure charters. Under these circumstances there has been the fullest latitude allowed for the operation of all those forces which have tended to further the growth. As a result, corporations have multiplied in the United States in a manner unheard of in countries whose legislation contains more restrictive features. According to the figures given in the new German encyclopædia (*Handwoerterbuch der Staatswissenschaften*, Article, *Aktiengesellschaften*, *Statistik*) such companies were founded in European countries for the year 1885 as follows: Austria, 10; Belgium, 472; France, 325; German Empire, except

Bavaria, 70; Great Britain and Ireland, 1,405. It is impossible to say how many were founded in the same year in the United States, but a glance at the table given later will show that the number must have been far greater even than that given for Great Britain and Ireland, since ten states only for which we have figures show a total of 1,779. In view of such an extraordinary record as this, it may not be out of place to study the growth of corporations with such material as we have at hand, pointing out the reasons which have led to it, and endeavoring to ascertain in what degree we may be able to secure for it a statistical measure.

We need not go far to seek the causes which lead to the foundation of corporations. They are economic and legal advantages over the conduct of enterprises by individuals or private firms. Corporations are founded for carrying on large enterprises for which the capital of individuals or groups of individuals is insufficient. This is their economic justification, and their services to the cause of industrial progress in making available sufficient capital for great enterprises like our railroads and ship canals have always been duly recognized. The inability, however, of securing a sufficient capital by other means is not the only reason leading to the foundation of corporative enterprises. A corporation possesses distinct advantages over the individual or business firm in its limited liability, and in its perpetuity. The latter point is of extreme importance. It renders an investment of capital secure as long as the business prospers. The business firm dissolves by the death of a member. The holder of the stock of a corporation, on the other hand, knows that at his death his heirs need not disturb the investment of the capital, and if they do so the enterprise itself is not interrupted but simply changes owners. Again, the form of a corporation renders changes in ownership very easy. Numerous corporations are formed simply and only for the purpose of getting rid of an enterprise which cannot readily be sold in any other way. These legal features are of much

importance also in the case of corporations which require for the exercise of their business the grant of franchises from public bodies. Wholly apart from the charge of monopoly which would be raised if a city, for example, were to give a private individual the right to construct a street railroad, it would hesitate to enter into such a contract for any number of years with a person who might soon die, and thus cause the contract to fall.

It is not our purpose to discuss here the relative justification of corporations founded upon one reason or the other. The question whether the formation of corporations simply for the legal advantages which result from this form of organization is to be approved cannot be answered by statistical means. Its discussion here would be out of place. In the following pages it shall be our endeavor to bring out simply the facts in regard to corporations, so far as our material will allow.

The materials at our disposal for a statistical study of corporations in the United States are neither numerous or complete. In the course of the following discussion no use has been made of the stock exchange manuals in which there is a great deal of information to be found, for these omit many corporations of prime importance for our investigation. What are termed mercantile stocks do not cut a very prominent figure in these manuals, and yet these are the most striking feature in the more recent history of corporative undertakings.

In the following tables we deal exclusively with figures gathered from official lists of charters granted to incorporations, which are usually compiled from the records in the office of the Secretaries of State. The list which follows shows the states which make such a publication and the document in which it may be found.

ALABAMA. No published list.

ARKANSAS. Secretary of State Report since 1886.

- CALIFORNIA.** No published list except in 1886. Records with Secretary of State.
- COLORADO.** Secretary of State Report since 1881.
- CONNECTICUT.** Vols. 8, 9, and 10. Special Laws.
- DELAWARE.** No published list.
- FLORIDA.** Secretary of State Report.
- GEORGIA.** No published list.
- ILLINOIS.** No published list.
- INDIANA.** No published list. Records with Secretary of State.
- IOWA.** No published list.
- KANSAS.** No published list.
- KENTUCKY.** No published list.
- LOUISIANA.** No published list.
- MAINE.** Business Corporations list since 1887.
- MARYLAND.** No published list. No records with Secretary of State.
- MASSACHUSETTS.** Commissioner of Corporations Report since 1863.
- MICHIGAN.** No published list.
- MINNESOTA.** Secretary of State Report.
- MISSISSIPPI.** Secretary of State Report since 1878.
- MISSOURI.** Missouri Manual for 1887-88, not previously.
- NEBRASKA.** Secretary of State Report since 1880.
- NEVADA.** No published list. Records with Secretary of State.
- NEW HAMPSHIRE.** No published list.
- NEW JERSEY.** List now in preparation.
- NEW YORK.** No published list.
- NORTH CAROLINA.** No published list.
- OHIO.** Ohio Statistics since 1871.
- OREGON.** Secretary of State Report since 1867.
- PENNSYLVANIA.** Pamphlet laws since 1874.
- RHODE ISLAND.** No published list.
- SOUTH CAROLINA.** Secretary of State Report since 1886.
- TENNESSEE.** No published list.
- TEXAS.** Secretary of State Report, 1888.
- VERMONT.** No published list.
- VIRGINIA.** Acts of Assembly since 1879-80.
- WEST VIRGINIA.** No published list. Records with Secretary of State.
- WISCONSIN.** Secretary of State Report since 1869.

The most casual glance at the list shows that we have data for comparatively few states. In all of these they are not available for purposes of comparison. In such circumstances we cannot hope to carry out certain lines of investigation. It would be useless to attempt even to estimate the total number of corporations chartered in any one year in order to compare this with figures for foreign countries. In many cases, however, in which the statistician may require complete figures to establish ratios between the subject of his study and others, he is able, nevertheless, to detect well defined tendencies even with the most incomplete data. It is with such general tendencies that we are concerned in this study. It is believed that, despite the many defects in the material, we may still reach some results of value to the student.

All the states mentioned in the list as publishing data do not figure in the tables which follow. For Oregon it was impossible for the writer to secure the reports. The report of the Secretary of State of Florida gives an account of his dealings with incorporated companies, but it is not clearly stated which relate to granting charters, and which to amending already existing ones. In Pennsylvania the list published in the pamphlet laws was, in the earlier numbers, made up to the date of publishing the laws, which was in some cases more, in some less, than a year from the last previous date of publication. More recently the list has been published for a biennial period, without any indication of the year in which the charter of each corporation is issued. The same holds true of the lists for Virginia. It is evident, therefore, that these states could not be introduced into the tables.

The lists to be found for the remaining states differ very considerably in their nature, and it must be our first task to ascertain in what degree this fact limits the use that may be made of them. The figures relate in the first place to different years, in some cases the calendar year, in others the fiscal years of the respective states. Again, the figures do not in-

clude all corporations chartered in the given year, but only those organized under general laws. An exception is in the case of Maine in the first table, in which all corporations are included. As a result of omitting corporations which are created by special acts, our figures are not exhaustive. The fact that a state has a general incorporation act does not warrant us in inferring that it does not grant charters by special legislation. For example, Massachusetts chartered in 1889 nine corporations for business purposes by special act, in addition to those organized under the general law. In other states the number is much greater, as, for instance, in Connecticut. Again, certain categories of corporations do not figure in the lists. Such, for instance, are railroad companies, which offer so many peculiarities that they can be better studied as a separate subject. Our present concern is with what are termed miscellaneous corporations. In the northern states this will not include banks as a rule, and in some insurance companies are not included. The exact facts will depend on the degree in which special officials are charged with the supervision of these special classes of corporations. The great bulk of corporations for business purposes will nevertheless be included in our figures, and the number for each state will be large enough for the purposes of our investigation. Enough has however been said to show that we cannot compare one state with another in the figures which we will present. Our comparisons must be confined to the figures for the different years for the same state. We can now proceed to the study of the actual figures with a clearer comprehension of their meaning than would have been possible without this extended discussion of the material.

We give in Table I the number of charters granted to corporations in several states for a series of years.

In this table we are able in some cases to give extended lists of figures, as some states in commencing the publication of periodical lists published also lists covering the previous years represented in the hitherto unpublished records. There

Table I.

CORPORATIONS CHARTERED.

	Arkansas. ¹	Colorado. ²	Connecticut.	Maine.	Massachusetts.	Minnesota. ³	Mississippi. ⁴	Missouri.	Nebraska. ⁵	Ohio. ⁶	S. Carolina.	Texas.	Wisconsin. ⁷
1820	3	....	....	....	....	....	....	....	....	....
1821	14	....	....	....	....	....	....	....	....	....
1822	10	....	....	....	....	....	....	....	....	....
1823	13	....	....	....	....	....	....	....	....	....
1824	9	....	....	....	....	....	....	....	....	....
1825	18	....	....	....	....	....	....	....	....	....
1826	18	....	....	....	....	....	....	....	....	....
1827	19	....	....	....	....	....	....	....	....	....
1828	12	....	....	....	....	....	....	....	....	....
1829	16	....	....	....	....	....	....	....	....	....
1830	13	....	....	....	....	....	....	....	....	....
1831	19	....	....	....	....	....	....	....	....	....
1832	21	....	....	....	....	....	....	....	....	....
1833	25	....	....	....	....	....	....	....	....	....
1834	44	....	....	....	....	....	....	....	....	....
1835	25	....	....	....	....	....	....	....	....	....
1836	129	....	....	....	....	....	....	....	....	....
1837	13	106	....	....	....	....	....	....	....	....	....
1838	22	33	....	....	....	....	....	....	....	....	....
1839	10	15	....	....	....	....	....	....	....	....	....
1840	4	3	....	....	....	....	....	....	....	....	....
1841	10	18	....	....	....	....	....	....	....	....	....
1842	5	11	....	....	....	....	....	....	....	....	....
1843	8	10	....	....	....	....	....	....	....	....	....
1844	9	17	....	....	....	....	....	....	....	....	....
1845	19	29	....	....	....	....	....	....	....	....	....
1846	18	43	....	....	....	....	....	....	....	....	....
1847	26	32	....	....	....	....	....	....	....	....	....
1848	14	28	....	....	....	....	....	....	....	....	....
1849	29	34	....	....	....	....	....	....	....	....	....
1850	38	25	....	....	....	....	....	....	....	....	....
1851	44	9	8	....	....	....	....	....	....	....	....
1852	85	54	20	....	....	....	....	....	....	....	....
1853	132	61	21	....	....	....	....	....	....	....	....
1854	107	63	13	....	....	....	....	....	....	....	....
1855	48	32	31	....	....	....	....	....	....	....	....
1856	26	38	27	....	....	....	....	....	....	....	....
1857	23	38	25	....	....	....	....	....	....	....	....
1858	18	14	11	....	....	....	....	....	....	....	....
1859	22	30	20	....	....	....	....	....	....	....	....
1860	26	31	21	....	....	....	....	....	....	....	....
1861	14	15	16	....	....	....	....	....	....	....	....
1862	18	17	20	....	....	....	....	....	....	....	....
1863	27	15	56	....	....	....	....	....	....	....	....
1864	77	32	174	....	....	....	....	....	....	....	....
1865	94	33	136	....	....	....	....	....	....	....	....
1866	22	59	163	....	....	....	....	....	....	....	....
1867	65	55	87	....	....	....	....	....	....	....	....
1868	72	50	89	....	....	....	....	....	....	....	....
1869	66	65	56	....	....	....	....	....	....	....	....
1870	62	77	29	....	....	....	....	....	....	....	9
1871	72	88	....	....	....	....	348	....	....	10
1872	64	82	....	....	....	....	387	55	....	8
1873	92	80	....	....	....	....	386	82	....	25
1874	111	78	....	....	....	....	279	91	....	54
1875	76	85	....	....	....	....	346	209	....	41
1876	26	63	....	....	....	....	261	153	....	67
1877	44	71	....	....	....	....	242	77	....	47
1878	35	68	....	....	....	....	226	81	....	53
1879	69	75	....	....	....	....	294	80	....	58
1880	262	145	....	5	....	....	12	....	....	....
1881	1129	95	269	153	....	14	....	....	14	392	....	90
1882	505	94	233	141	....	27	....	....	27	477	....	99
1883	101	255	135	118	39	....	....	36	581	....	164
1884	76	226	143	233	33	....	....	58	602	....	190
1885	93	241	113	215	29	....	....	76	507	....	189
1886	38	....	98	229	143	280	38	....	....	63	578	....	226
1886	62	....	98	229	143	280	38	....	....	113	621	....	183
1887	118	450	115	362	156	397	57	407	203	775	20	288	262
1888	121	470	108	302	195	404	69	446	207	664	49	271	579
1889	368	233	372	85	....	....	748	78	....	383

¹ Manufacturing corporations. ² Year ends Nov. 30th. ³ Year ends July 31st. ⁴ Includes companies with capital before 1884. After that date no figures as to capital being found in the reports. I have given the number of such corporations as were *apparently* business corporations. In 1882 there were 17 such, the remainder being marriage associations. ⁵ Year ends Nov. 30th. ⁶ Year ends Nov. 15th. Includes railroad companies. ⁷ Year ends Sept. 30th.

are however some unfortunate gaps in the table. Connecticut published in 1870 a list of corporations chartered previous to that date, but in 1880 the published list contained only such companies as were then in existence. As a consequence the intervening years had to remain blank in our table. The gaps under Wisconsin and Colorado, on the other hand, occur through my inability to secure the reports. In passing, it may be well to explain that the enormous number of corporations in Colorado in the year 1881 is due to the formation of mining companies in that year on the whole-sale.

A study of the foregoing table shows a constant increase in the number of corporations chartered from year to year. This increase is not however uniform, but follows the ups and downs of business prosperity with great regularity. The influence of periods of speculation can be read very clearly in the figures of the table. Thus in Maine the number chartered in the years 1886 is not reached again until we reach the year 1880, and the number chartered in 1887 is only exceeded by one year before the same date. Again, we would call attention to the small number chartered in the year 1858. In more recent times we can see the influence of the speculative period which culminated in the crisis of 1873. Despite however these fits and starts, which index in a measure the business prosperity of the time, the general tendency has been to increase. This has been notably the case since the year 1880. It seems almost as if this year were the dividing line between an old and new period.

It is not an uninteresting study to observe how the character of corporations has changed during the period for which we have figures. So far as the names of corporations are any indication of the purposes for which they are formed, the Maine list gives us some insight into this matter. In earlier days the companies which figure most largely are stage companies, road companies, canal companies, and insurance companies. Later on railroads assume more import-

ance, and at the same time the number of gas companies grows rapidly as this form of lighting is introduced into cities. In the last decade the growth has been mainly among manufacturing companies. The same facts are brought out in Table II, which gives the different species of corporations chartered in Ohio for a series of years.

It will be noticed here that certain things at one time very prominent entirely disappear later on, as, for instance, turn-pike companies. Railroads also are much more of a feature in the years 1851-78, for which a summary is given, than they are in the concluding years of the table. Manufacturing companies have constantly grown in importance. On the other hand, insurance companies remain stationary. Electric light and power companies are of course unknown in the earlier period, while the discovery of natural gas has since the year 1885 greatly increased the number of gas companies. In a measure, we have a picture in the figures of the changes which have occurred in the business of the country during the last forty years. It cannot be denied that the picture would be less indistinct by the calculation of percentages, but as it stands the outlines may be discovered.

Some of the lists permit a study of the capital of corporations chartered. Table III gives us certain facts with reference to Massachusetts.

This table distinctly shows that the recent growth in the number of corporations has not been due to the inauguration of numerous enterprises requiring vast capital, but to the application of this form of doing business to enterprises with small capital. This is undoubtedly a departure from the idea under which companies were first formed. It has therefore been called an unnatural development of the corporation. This is not, however, to be discussed here; it is our purpose to ascertain simply the facts in the case. Looking at the averages, we see an irregular but, on the whole, constant decline in the average capital per corporation. It seems proper to overlook the period before 1860 in this mat-

Table II. PURPOSES FOR WHICH CORPORATIONS WERE CHARTERED IN EACH YEAR IN OHIO.

Year.	Banks, Savings and Loan Associations.	Building and Loan Associations.	Co-operative Trade Associations.	Electric Light and Power Companies.	Gas Companies.	Insurance Companies.	Life, Fire and Marine.	Manufacturing Companies.	Mining Companies.	Plank Road Companies.	Printing and Publishing Companies.	Railroad Companies.	Street Railroad Companies.	Telegraph and Telephone Companies.	Turnpike Companies.	Companies for various purposes.	Total.
1871	..	98	2	..	4	9	9	118	29	..	15	47	11	..	5	19	348
1872	..	57	..	..	..	3	3	124	55	..	12	62	14	..	6	44	387
1873	..	64	2	..	4	6	6	136	39	1	20	32	17	3	3	36	386
1874	..	47	3	..	1	2	2	99	28	2	13	12	10	..	8	36	279
1875	..	64	7	..	4	5	5	95	28	..	11	28	20	3	1	52	346
1876	..	38	40	..	3	11	11	57	23	..	11	26	5	4	8	25	261
1877	..	32	29	..	2	27	27	57	12	..	12	28	4	4	5	45	242
1878	..	28	8	..	8	4	4	71	14	1	10	30	4	..	4	42	228
1879	..	34	5	..	6	3	3	110	26	2	6	27	5	..	3	64	294
1880	..	56	7	..	2	1	1	176	41	..	11	35	6	..	..	38	392
1881	..	47	4	19	5	4	4	171	31	..	16	67	4	15	..	89	477
1882	..	75	4	4	5	4	4	253	34	..	19	42	6	6	..	95	581
1883	..	97	8	16	8	3	3	250	35	..	25	37	4	9	..	101	602
1884	..	58	5	15	10	8	8	200	23	..	25	18	5	9	..	121	507
1885	..	52	5	8	37	7	7	196	18	..	26	17	5	28	..	165	578
1886	..	62	3	11	89	23	23	205	17	..	28	37	7	26	..	119	621
1887	..	84	22	20	183	15	15	257	30	..	19	36	23	19	..	156	775
1888	..	93	6	25	36	8	8	277	31	..	29	20	10	1	..	132	694
1889	..	90	4	51	30	8	8	312	23	..	16	24	19	2	..	156	748
1891-73	21	450	27	..	77	112	112	1,011	324	45	100	360	118	13	300	998	2,958

Table III. CORPORATIONS CHARTERED UNDER GENERAL LAWS OF MASSACHUSETTS.

Capital in Groups of Thousand Dollars.														
Number.	Capital.	Average Capital.	Under 5	5-10	10-20	20-30	30-50	50-100	100-250	250-500	500-1000	1000-3000	3000-5000	5000 and over.
1851	8	\$409,800	..	2	1	..	2	1	2	..	..	..	..	..
1852	20	986,800	..	4	2	..	2	6	3	..	1	..	..	..
1853	21	2,022,000	..	2	2	3	5	4	4	..	..	..	..	..
1854	13	783,000	..	..	1	5	3	..	4	..	..	..	..	..
1855	31	1,688,100	..	4	8	5	3	..	5	..	..	..	..	..
1856	27	1,887,900	..	5	3	4	4	7	3	1	2	..	..	..
1857	26	1,683,500	..	3	3	7	4	4	2	..	..	..	..	..
1858	11	563,500	..	..	2	1	3	4	1	..	1	..	..	..
1859	20	1,775,500	..	4	3	3	1	4	2	3	..	1	..	..
1860	21	3,520,750	1	2	5	2	1	4	7	..	..	1	..	..
1861	16	746,200	..	4	3	2	..	4	4	..	..	..	..	..
1862	50	1,211,863	..	3	2	3	3	5	4	..	..	..	..	..
1863	56	10,578,000	..	2	3	6	3	4	18	12	8	..	..	..
1864	174	43,878,000	..	..	5	4	8	17	54	44	39	..	..	..
1865	136	26,315,500	..	2	1	8	10	18	54	26	18	..	..	..
1866	103	14,450,500	..	1	7	9	6	21	39	16	4	..	..	..
1867	87	9,721,000	..	3	2	14	5	23	27	8	3	..	..	..
1868	89	10,986,975	..	7	6	10	6	18	29	7	7	..	..	..
1869	56	6,465,300	..	1	4	4	6	14	19	3	4	..	..	..
1870	29	3,405,000	..	5	3	4	3	5	9	2	2	..	..	..
1871	88	10,197,950	7	6	11	12	5	21	21	9	6	..	..	..
1872	83	10,687,850	6	4	10	10	5	15	20	6	7	1	..	..
1873	89	8,737,450	6	4	10	13	18	18	19	4	4	1	..	..
1874	78	5,370,360	4	10	13	7	11	14	12	6	3	..	..	..
1875	85	5,362,650	17	4	8	13	11	13	15	3	1	..	..	..
1876	68	4,100,210	8	12	4	9	3	9	10	3	2	..	..	..
1877	71	5,827,375	7	8	12	8	6	17	10	3	..	..	..	..
1878	68	5,090,750	7	12	9	7	8	17	12	3	..	1	..	..
1879	75	6,027,925	6	11	11	9	7	15	13	3	..	1	..	..
1880	145	19,755,480	6	14	24	16	15	21	35	11	5	2	..	1
1881	153	14,842,100	12	21	25	15	10	18	32	35	6	1	..	..
1882	141	9,436,820	14	17	28	19	14	20	21	4	3	1	..	..
1883	135	9,792,100	8	25	32	12	17	22	19	5	4	1	..	..
1884	143	9,676,200	12	23	33	15	18	20	25	7	3	..	..	..
1885	113	5,473,700	15	17	33	15	9	15	15	4	1	..	..	..
1886	145	5,507,750	20	24	34	20	12	14	15	4	..	..	..	..
1887	155	6,514,200	16	29	33	16	23	8	15	16	3	2	..	..
1888	196	10,592,950	18	29	43	35	22	18	23	6	3	1	..	..
1889	233	10,669,235	23	29	57	44	24	25	20	9	3	..	..	..

NOTE.—The figures given in the above table represent as far as possible only business corporations. Since the year 1880 these have had a separate list in the reports. Previous to that date it was a comparatively easy matter to separate out such corporations which, though having capital, were not organized for strictly business purposes. This will account for discrepancies between figures given here and in the reports.

ter, as there was at that time a totally different meaning attached to the ideas small and large capital. For the period subsequent to that date the fact is apparent. One may also compare the average capital of the corporations chartered in 1889, \$45,705, with that of the corporations sending in annual returns in the same year, which was \$167,907. If we turn now to the groups into which we have classified the capital, we find that from 1863 to 1881 the largest group each year is either that of \$100,000 to \$250,000 or, in three years only, that of \$50,000 to \$100,000, whereas after the year 1881 the most numerous group is either that of \$10,000 to \$20,000 or, in two cases, that of \$5,000 to \$10,000. Again, make the amount \$30,000 a dividing line, and it will be seen that in the first period here alluded to the majority of all corporations is on the upper side of the line, and in the latter period on the lower. The reader will be surprised to note the large number of corporations whose capital does not exceed \$5,000. The greater part of these are coöperative associations, though not exclusively so. In this class one finds in Massachusetts and elsewhere a considerable number of creamery associations.

The fact here established, at least so far as Massachusetts is concerned, is of the first importance. It indicates that companies are formed not so much because of the economic difficulty of conducting enterprises on any other basis, but because of other, legal, advantages which arise from this form of employing capital. There is ample reason to suppose that in many of the cases here classified there is no new enterprise whatever, but merely a conversion into a corporation of a business hitherto carried on successfully by a private firm. We shall return to this point later. The main result of our investigation thus far, that the recent growth has been mainly among the smaller companies, is capable of further proof. In view of the importance of this point, we present additional tables on the subject. Table IV gives the facts for the manufacturing corporations chartered in Ohio for a series of years.

Table IV.

CAPITAL OF MANUFACTURING CORPORATIONS CHARTERED IN OHIO, UNDER GENERAL LAWS.

Year.	Number.	Capital.	Average Capital.	Capital in Groups of Thousand Dollars.												
				Under 5	5-10	10-20	20-30	30-50	50-100	100-250	250-500	500-1000	1000-3000	3000-5000	5000 and over.	
1872	134	\$17,554,500	\$131,004	..	2	5	15	12	36	50	5	5	4	..	..
1873	138	16,321,000	118,268	1	1	10	16	12	35	45	10	8	1	..	..
1874	99	9,172,500	92,651	2	3	7	9	13	29	29	5	2	..	..	..
1875	95	15,381,500	161,910	1	5	9	13	6	25	26	5	3	2	..	..
1876	57	5,309,000	93,140	1	2	4	5	4	13	24	4	..	..	..	..
1877	57	8,529,000	149,632	..	1	6	8	5	10	18	5	3	1	..	..
1878	71	13,841,400	180,865	1	6	7	8	4	16	23	2	1	2	..	1	
1879	110	18,477,600	167,979	3	5	13	16	13	30	23	6	..	1	..	1	
1880	176	24,363,000	138,426	3	12	30	26	23	29	31	8	9	4	..	1	
1881	171	19,917,000	116,474	5	10	18	22	12	33	51	12	5	3	..	..
1882	283	26,225,750	128,006	6	11	33	41	27	60	59	24	13	9	..	..
1883	250	20,730,500	82,922	3	11	29	40	25	59	59	18	4	2	..	..
1884	200	22,579,600	112,896	4	16	26	28	17	45	44	12	5	2	..	1	
1885	196	17,141,500	87,456	5	11	35	32	9	49	37	10	7	1	..	..
1886	205	27,410,900	137,151	10	21	31	40	9	39	37	12	2	2	..	2	
1887	257	19,161,900	74,949	3	26	39	52	14	53	54	8	6	2	..	..
1888	277	17,530,850	69,176	9	21	32	60	14	80	48	8	4	1	..	..
1889	312	28,996,900	92,937	12	18	54	57	28	71	58	9	2	2	..	1	

The growth of small corporations is not seen quite so clearly in this table as in the preceding. Yet it will be observed that in the later years the average capital per corporation varies between decidedly lower limits than in the earlier years of the table. In the groups also we can observe that the groups \$10,000 to \$20,000 and \$20,000 to \$30,000 increase in importance as compared with the groups \$50,000 to \$100,000 and \$100,000 to \$250,000. Make in this case a dividing line at \$50,000, and it will be seen that the number below this, at first considerably less than that above, becomes later almost the same as the latter.

In Table V, which follows, giving the facts for some other states, we do not find the growth of small corporations observed in Ohio and Massachusetts. In the western states, however, mining companies play a more important part, and this brings about the great irregularities observed in the

averages. It is not improbable that, if such companies could be sifted out, the fact elsewhere observed could be seen here also. The figures of the two preceding tables establish the fact very plainly for the eastern portion of the country, an inference that receives additional weight from the fact that such a development has been observed in European countries. Table V, which shows that our generalizations must not be carried too far, follows.

It is a matter of common observation that existing business enterprises are often turned into corporations for some advantages expected to flow from this form of organization. It is therefore evident that the new corporations do not represent new enterprises exclusively, or new investments of capital. The question arises, to what extent this is the case. A partial answer at least can be gleaned from the Massachusetts reports. All companies are required to report to the commissioner of corporations that the capital stock has been paid in, and also in what form of property such payment has been made. The facts upon these points are given in Table VI.

It is very clear from the foregoing table that the payment of cash is a small part of the capital actually invested in corporations, from which we may very readily infer that the great majority of corporations are formed on the basis of previously existing enterprises. This receives additional support from the fact that of the corporations certifying to the payment of capital in 1885 there were only seven in which the total capital was paid in cash, in 1886 twenty-two, in 1887 sixteen, in 1888 twenty-five, and in 1889 forty-one. If we ask whether the new investments of capital tend to change in the period observed, we find little change between the earlier and later years of our table. If differences exist at all, they are rather in favor of the later period, in which the investment of cash seems to bear a larger proportion of the amount invested than formerly.

The figures which have thus far been presented relate to

Table V.

CAPITAL OF CORPORATIONS.

	Year.	Number.	Capital.	Average Capital.	Capital in Groups of Thousands Dollars.											
					Under 5	5-10	10-20	20-30	30-50	50-100	100-250	250-500	500-1000	1000-5000	5000-10000	10000 and over.
Wisconsin.	1880	90	\$8,246,060	\$91,623	21	6	11	17	5	6	18	2	2	2	..	
	1881	99	15,064,090	152,162	15	6	15	10	4	22	15	3	5	3	1	
	1882	164	13,647,114	83,214	23	13	29	21	14	19	23	18	3	1	..	
	1883	190	33,745,400	177,607	15	16	28	25	13	15	30	12	19	6	..	
	1884	189	27,355,070	144,736	30	20	24	26	17	24	23	9	9	5	1	
	1885	183	14,138,951	77,808	41	15	31	20	10	19	33	4	8	2	..	
1886	262	85,890,080	324,008	29	20	33	26	15	32	33	5	18	29	2	1	
Nebraska.	1879	12	6,508,000	542,333	..	1	4	..	1	4	1	..	..	..	1
	1880	14	7,302,000	521,572	2	1	..	4	..	2	2	1	1	..	1	
	1881	27	1,416,800	52,466	4	1	2	6	2	7	4	1	..	..	..
	1882	36	3,107,500	86,319	3	3	4	2	3	8	9	4	..	..	..
	1883	58	18,080,600	221,028	10	4	9	8	2	7	11	4	2	..	1	
	1884	76	8,390,650	110,403	7	7	8	15	4	14	14	..	4	3	..	
	1885	63	12,287,000	194,888	2	5	4	7	7	16	11	4	6	2	1	
	1886	113	19,123,300	169,223	5	4	15	19	12	24	27	3	2	1	1	
	1887	203	34,832,300	171,587	5	15	20	31	14	35	47	6	20	7	3	
	1888	207	65,636,240	317,083	10	4	25	27	14	57	32	14	12	4	7	
Arkansas.	1885	38	6,777,825	178,364	7	3	6	5	3	10	2	..	1	..	1	
	1886	62	49,333,200	795,697	6	8	9	4	9	8	5	1	1	2	6	
	1887	118	101,789,700	862,625	7	13	16	7	7	25	6	4	6	7	9	
	1888	121	18,378,050	151,885	10	8	17	20	9	27	13	5	6	3	3	
S. Carolina.	1887	20	906,300	45,315	1	..	3	5	2	6	3	..	..	..	..
	1888	49	2,396,325	48,894	4	3	12	9	7	5	7	2	..	..	..
	1889	78	2,812,100	36,052	12	6	16	15	5	12	12	..	..	..	..
Mississippi.	1878	5	125,000	25,000	..	1	2	..	..	2	..	..	..	..	..
	1879	5	250,000	50,000	..	..	..	..	..	5	..	..	..	..	..
	1880	14	336,500	23,964	3	..	5	2	1	2	1	..	..	..	..
	1881	27	1,555,000	57,592	5	2	2	5	3	7	1	1	1	..	..
	1882	206	7,054,800	34,246	6	122	50	8	2	7	7	1	..	3	..	
	1883	39	2,920,300	74,879	6	3	1	6	2	16	4	2	2	..	..
Missouri.	1887	407	27,941,885	68,653	45	46	76	52	42	62	55	19	7	3	..	
	1888	446	28,761,340	64,483	50	64	80	60	45	72	52	12	6	5	..	

the foundation of companies. It would be very instructive if we could add data as complete on the duration of the companies, especially if, by showing how many companies founded in each year survive after a given period, we could charac-

Table VI. PAYMENT OF CAPITAL. CORPORATIONS IN MASSACHUSETTS.

Year.	Number.	Capital Paid In.	Capital paid in.				Number of Corporations of which Capital is wholly or partially paid in.			
			In Real Estate.	In Personal Estate.	In Mixed Estate.	In Cash.	Real Estate.	Personal Estate.	Mixed.	Cash.
1870	26	\$1,617,000	\$73,164	\$964,764	\$285,779	\$308,395	6	16	5	15
1871	63	5,673,654	1,323,005	3,422,586	1,468,175	299,378	20	40	19	21
1872	68	8,992,500	1,517,144	4,578,722	2,143,506	253,118	22	49	11	24
1873	74	9,875,800	1,377,176	4,319,946	3,956,986	322,790	21	51	15	23
1874	63	7,160,260	1,595,855	2,394,131	2,454,000	376,374	24	38	16	23
1875	86	6,989,460	711,431	2,940,235	2,675,580	671,384	23	56	20	32
1876	70	4,580,200	976,095	1,558,547	1,571,983	452,575	15	52	12	26
1877	71	5,693,775	1,775,943	1,427,372	1,444,767	1,021,374	23	47	11	30
1878	61	4,843,500	760,945	2,108,451	918,000	1,038,304	17	47	6	29
1879	46	2,990,500	622,779	1,662,784	372,000	421,387	12	31	6	25
1880	114	17,215,005	1,594,019	11,594,386	2,134,086	1,903,564	30	75	24	63
1881	119	10,578,400	1,351,365	4,964,727	2,905,325	1,298,362	30	77	23	57
1882	127	11,356,900	1,873,538	6,212,965	1,363,643	1,876,754	32	84	18	67
1883	117	10,833,900	2,253,450	3,688,096	3,164,210	1,728,174	33	76	21	67
1884	125	9,196,350	867,869	3,465,579	2,454,434	2,000,408	25	85	18	66
1885	89	5,397,200	634,351	2,752,372	577,631	1,342,446	19	75	17	45
1886	118	5,045,350	873,593	2,094,102	274,364	1,803,301	24	83	9	67
1887	121	5,065,900	1,700,586	2,917,080	.....	985,364	36	84	..	69
1888	142	7,392,250	1,536,495	3,577,693	.....	2,189,062	39	104	..	76
1889	183	9,967,085	4,664,461	3,710,009	.....	1,572,665	63	124	..	104

terize in a measure the period of foundation, as one of speculation or of sound conservative enterprise. Unfortunately for anything like this, the figures are conspicuously deficient. Here is the weak point in our statistics. We are only able to present one or two facts, which, of certain value as symp-

toms, can claim no further significance. In 1870 the state of Connecticut incorporated, as shown in Table I, sixty-two companies. In 1880 the Secretary of State published a list, giving the corporations under state laws then doing business in the state, and the number for 1870 was twenty-eight, or less than fifty per cent. In the same year, 1880, previous to the construction of the list mentioned, a statute of the state had annulled the charters of no less than 1,285 companies, most of which had probably long since ceased to have any actual existence. According to figures furnished in Table II, there were chartered 3,956 business corporations in Ohio in the years 1851-73, while in the latter year the county auditors reported only 1,148 companies as paying personal property taxes. This will show that it is utterly impossible to gather from the figures showing incorporations the number of corporations actually carrying on any business. It is not meant by this that such companies are peculiarly subject to failure, for the fact may be largely explained by the well-known fact that so many corporate enterprises never get any further than organization, which is a much simpler matter than obtaining subscriptions to the stock. In the state of Massachusetts, as already stated, corporations are required to file a certificate of the payment of their capital stock. Between the years 1870 and 1888 there were 2,204 corporations chartered in that state, but up to the end of the year 1889 certificates of the payment of capital had been filed by 1,889 corporations, leaving quite a number that never reached the point of collecting their capital. Many fail or go into voluntary liquidation after successfully starting. According to the requirements of the Massachusetts law, all business corporations must make an annual report of condition to the commissioner of corporations. Failure to do so leads to an annulment of the charter. In 1870 there were 181 corporations making such returns. From 1870 to 1888 there were chartered, as shown in Table III, 2,051 corporations, or a total of 2,232, which, if all were in existence, should make returns in 1889. But the number making returns in the last year was

1,369, leaving 868 unaccounted for. Some never paid in their capital stock, as already seen, and the remainder have dropped off on the way. The question naturally arises, Is not this a very large percentage of falling off? Unfortunately, there are no means of answering the question. To do so we should have to compare the figures given with the number of business enterprises of every description started and discontinued.

The results of our investigation are sufficiently clear to require no special summing up. In conclusion, some remarks on the statistics themselves may not be out of place. It is rather surprising that in a matter of such general interest so few states should publish even the lists of companies incorporated. As long as this remains the case it will be impossible to secure anything like exhaustive figures on the subject. Looking through the reports of the different Secretaries of State, I find suggestions on the subject of annual returns in several cases. If carried out, these would give us valuable figures, especially in states where the formalities of taking out certificates of incorporation are not so strict as in Massachusetts, whose laws on the subject of corporations are the most complete of any state in the Union. Beyond the few points touched on in the preceding pages the statistics of private corporations cannot go without the expenditure of a great deal of effort. Much remains to be done to perfect the points which we have discussed. To take up new points, the principal which suggest themselves are a comparison of the number of new corporations with new business firms, as well as the failures in each class. Again, considerable information could be gained from the dividends paid by companies. It will readily be seen that these desirable points hardly come within the range of practicability except for some special investigation furnished with large means. For some reason or other, corporations as such have never sufficiently occupied public attention to become the subject of official investigation either in this country or in Europe. The attainable facts for foreign countries, therefore, do not go much further than those furnished here for single states of this country.

REVIEWS AND NOTICES.

ENGLISH LABOR STATISTICS.

Statistical Tables and Report on Trade Unions. Third Report. (Report by the Labour Correspondent of the Board of Trade.) London, 1889. Pp. 262.

Report on the Strikes and Lockouts of 1888. By the Labour Correspondent to the Board of Trade. London, 1889. Pp. 104.

Returns of Expenditure by Workingmen. (Commercial Department Board of Trade.) London, 1889. Pp. 49.

Returns of Rates of Wages in the Principal Textile Trades of the United Kingdom with report thereon. (Robert Giffen, Board of Trade.) London, 1889. Pp. xxxviii, 152.

Of the above four English parliamentary blue books, relating to labor statistics, the most novel to Americans is probably the one devoted to trade unions. There is no comprehensive report concerning the condition of trade unions made in the United States. Some of the separate state bureaus of labor statistics have collected information in regard to trade unions existing within particular states, but such an inquiry cannot be complete. I make the suggestion that this might be an interesting field of investigation for the National Department of Labor, although it must be confessed that as yet the trade unions in this country are not so important or powerful organizations as those existing in England.

The first report upon Trade Unions of England covered the year 1886,—the third one relating to 1888. The report is made by an official termed the Labor Correspondent, and submitted to the Assistant Secretary of the Commercial Department of the Board of Trade. It deals with the number of members belonging to trade unions; their contributions; the percentage of members who have enjoyed unemployed, sick, and superannuated benefits; and the amount per capita of membership paid for such benefits. There are also detailed tables relating to 104 different unions. The reports of some of these societies run back for a period of thirty or forty years,

thus furnishing a considerable mass of comparative material. There are two tables showing the chief causes of death in certain societies, with average ages at death, and the kinds of accident or diseases for which accident or disablement benefits are paid. In the Appendix there are extracts from the latest annual statements of various unions and a list of societies which sent no returns. Of these there are nearly 150. It is thought, however, that more than one-half the membership of trade unions is embraced in the report, the exact number being 373,904.

The income of 100 of these societies in 1888 amounted to £744,309, while the expenditure was £596,671. The total property on hand was valued at £707,583. The analysis of the expenditure accounts of some of the largest unions gives interesting results. The largest union is the Amalgamated Society of Engineers with a membership of 53,740. The following is a consolidation of the expense accounts :

Unemployed Benefits,	£54,740
Sick Benefits,	32,160
Superannuation Benefits,	86,343
Accident Benefits,	8,057
Benevolent Fund,	2,059
Funeral Fund,	9,381

At the same time it may be observed that of the total membership but 4.2 per cent received the unemployed benefit; 2.5 per cent the sick benefit; and 3 per cent the superannuation benefit. The highest percentage ever upon the unemployed list was 13.3 per cent in 1879.

Again, the Carpenters and Joiners in 29 years expended for the support of unemployed members £330,690; for sick members, £223,843; for funerals, £40,828; for accidents, £23,720; and for superannuation, £22,003.

The per capita contributions in the several trades vary greatly. I have counted five in which this was more than £3 for the year. The foregoing memoranda indicate a few of the special lines of inquiry which might be made in this report. It is to be regretted that in neither this or in the other English reports on labor statistics are there combination statistical tables, connecting different questions of interest, such as are found in great abundance in the reports issued by the Massachusetts Bureau of Labor Statistics.

The first comprehensive statistical treatment of labor disputes or strikes in England was made under private investigation by Mr.

Bevan for the *Royal Statistical Journal* in a paper published in 1880. The inquiry covered the strikes occurring during the period 1870-79. It was not until 1888 that any public official attempt was made to collect information on this subject. This first attempt failed, as very few returns were made to the schedules which were distributed. The plan of collecting information was then changed. Intelligence in regard to strikes was sought for through the daily papers, and this time with more success. By this means 509 disputes in which stoppage of work occurred were noted in 1888. Although no absolutely definite judgment is possible, it is thought that strikes are somewhat less frequent than they were from ten to twenty years ago, and that those occurring are now readily brought to a conclusion. The following table shows the chief causes of dispute and the results of the strikes : —

Cause or Object.	Total Number.	Number Successful.	Number Partially Successful.	Number Unsuccessful.	Result not Known.
For advance in wages.....	330	175	76	48	21
Against reduction in wages.....	54	12	3	29	10
Dispute as to amount of recent advance....	2	2	..	..	..
Dissatisfaction with conditions of work, hours, material, etc.....	66	34	9	22	1
Dispute between classes of work people....	2	2	..	..	..
Against alteration of working and residential arrangements.....	22	8	3	8	3
For introduction or defence of Union rules, etc.....	10	4	1	2	3
For reinstatement of certain men.....	6	3	2	1	..
Dissatisfaction with superior officials.....	15	8	..	5	2
Cause not known.....	12	1	..	1	10
Total.....	509	249	94	116	50

There is considerable descriptive material in this report, including a survey of English legislation upon the subject.

In the *Returns of Expenditure by Working Men*, an attempt is made to draw up "workingmen's budgets" much after the method of LePlay and Engels. The results of the inquiry, however, are not regarded as satisfactory. Of 780 forms sent out but 86, or about 5 per cent, were returned, and of these, two were not in a condition suitable for publication. The experience of this inquiry leads the author of the report to regard other budgets which have been pub-

lished as of dubious value. The Board of Trades are satisfied that the greater part of the budgets hitherto published, "most have been trimmed by the compilers, and the process, though perhaps excusable, raises many doubts as to the original basis of these budgets." No attempt at trimming, however, is made here, for the original budgets are published as obtained.

The incomes in the 84 budgets vary from £28, 12s. to £150 per annum. This extreme variation forces the observation that "these figures are enough to show that no exact annual budget could be drawn up without a good deal of trimming and cooking." As might be expected, there is little success in analyzing and comparing the returns according to Dr. Engels' law of expenditures.

In the introduction of the report upon *Wages in the textile trades*, Mr. Giffen points out that in nearly all statements of wages made in England, including the researches of Mr. Leone Levi and Mr. Dudley Baxter, the statistical view has been lacking, as there has been no attempt to correct the rates of wages with the proportionate numbers paid at each rate. It is on this point in particular that Mr. Giffen desires to furnish reliable data. The wages reported upon relate to one particular week in October, 1886, and cover about one-fourth of the total number engaged in the cotton, woollen, worsted, and linen industries. The following table gives a summary of wages :—

COMPARISON OF NORMAL WAGES IN THE COTTON, WOOLLEN, WORSTED,
AND LINEN TRADES IN 1886.

ANNUAL.				
	Cotton.	Woollen.	Worsted.	Linen.
	£ s.	£ s.	£ s.	£ s.
Men	65 13	60 0	60 13	51 13
Lads and Boys	24 4	22 0	16 18	16 4
Women	39 15	34 9	31 0	23 3
Girls	17 17	19 7	16 0	12 17

WEEKLY.				
	s. d.	s. d.	s. d.	s. d.
Men	25 3	23 2	23 4	19 9
Lads and Boys	9 4	8 6	6 6	6 3
Women	15 3	13 3	11 11	8 11
Girls	6 10	7 5	6 2	4 11

The annual wages in the foregoing table are obtained by multiplying the wages of one week in October by 52. The possibility of unemployed time is touched upon, but is not regarded as a serious consideration. It is, however, doubtful if any wage statistics can be regarded as of much final value that do not weigh very accurately the loss of time throughout the year. The tables showing the distribution of wage earners according to rates of wages are of great interest. But a single reference can be made. Of 142,784 employed in the cotton trade, more than one-half, 81,240, receive wages above the average, 18,353 at the average, and about one-third, 43,141, below the average. The detailed statistics on this point are so abundant in this report that wage statistics can henceforth be treated far more intelligently than in the past.

DAVIS R. DEWEY.

MEMORANDA ON THE FALL IN RATES OF INTEREST.

In the following pages a few notes are offered on the fall in rates of interest which has taken place in this country in recent years. In order to determine its course and limits, in the spring of 1889 I deduced the net average rates of interest realized from 1869 to that date by twenty leading life insurance companies, viz., the *Ætna*, Connecticut Mutual and Travelers of Connecticut; Berkshire, Massachusetts Mutual, New England Mutual, and State Mutual of Massachusetts; Equitable, Germania, Home, Manhattan, Mutual, New York, United States, and Washington of New York; Mutual Benefit of New Jersey; National of Vermont; Northwestern Mutual of Wisconsin; and Penn Mutual, and Provident Life and Trust of Pennsylvania; and the result was published in the last or 46th Annual Report of the Directors of the New England Mutual Life Insurance Company, which I have the pleasure to serve as Actuary.

Since then I have similarly determined the rates of the same companies for 1889, an abstract of the complete results being stated in the following table:—

TABLE SHOWING THE HIGHEST AND LOWEST RATE REALIZED BY ANY COMPANY, AND THE AVERAGE RATE REALIZED BY ALL THE COMPANIES IN EACH YEAR, TOGETHER WITH THE QUINQUENNIAL AVERAGE OF THE LATTER.

Year.	Highest.	Lowest.	Average.	Quinquennial Average.
1869	8.2	3.9	6.0	....
1870	7.2	4.5	5.9	....
1871	7.2	4.9	6.1	6.1
1872	8.9	5.5	6.2	....
1873	8.3	5.6	6.5	....
1874	7.8	4.9	6.2	....
1875	8.4	5.6	6.5	....
1876	8.2	5.3	6.1	5.9
1877	7.7	4.8	5.6	....
1878	7.1	3.4	5.1	....
1879	6.7	3.8	5.0	....
1880	5.6	3.6	4.8	....
1881	6.3	3.8	4.8	5.0
1882	7.8	4.1	5.1	....
1883	6.8	4.1	5.1	....
1884	5.7	4.0	4.7	....
1885	6.0	1.9	4.7	....
1886	6.7	3.9	4.9	4.7
1887	5.6	3.9	4.7	....
1888	5.3	3.6	4.6	....
1889	5.6	3.7	4.6	4.6

I doubt if it would be possible to obtain more sufficient representative and reliable statistics upon the point in question.

Twenty companies could not have been selected which had enjoyed more uniform success during the whole period under observation. Their figures were taken as found in the sworn reports annually made to the insurance officials of the states of Massachusetts and New York. The assets of these companies on Dec. 31, 1868 and 1889, were:—

	Assets, 1868.	Assets, 1889.
Real Estate,	\$4,424,662	\$70,940,544
Mortgages,	49,887,226	252,842,743
Government Securities,	19,887,876	} 240,804,267
State, County, and Town Securities,	10,180,318	
Bank Securities,	1,716,666	
Railroad Securities,	1,361,308	
Collateral Securities,	1,799,604	33,805,525
Premium Notes Securities,	31,303,294	12,341,660
Cash and other items,	14,671,518	50,877,886
Total,	\$184,182,472	\$660,612,625

They thus covered a considerable fraction of the safe investment securities of the country, divided in somewhat equal proportion to the total amount of each between the several leading sorts.

It would be invidious to quote specifically the figures of individual companies here, and I shall not do so; but it may be said that they all exhibit about the same course as respects decline in rates. Thus the quinquennial average rates of the company which appeared to have enjoyed the highest general average rate for the whole period were for 1869-73, 6.9; 1874-78, 7.6; 1879-83, 5.8; 1884-88, 5.5; and 1889, 5.6 per cent. The high average for the years 1874-78 was due to fortuitous circumstances, as the great drop to the succeeding quinquennial rate shows.

The general conclusion of this study is that the decline in rates began with 1876 and nearly ceased with 1884, since which time a pretty constant low rate has prevailed. The rates for the last two years are by .1 per cent the lowest of the whole period, and it may be safely assumed that whatever changes may occur in future these may be taken as about the maximum rates which there is any reason to expect in times of commercial quiet.

It is proper to state that in determining all the rates given in these notes I have taken the cost of investment at .5 per cent, which must be added to my figures in any case to show the gross rate.

WALTER C. WRIGHT.

May 7, 1890.

ELECTION STATISTICS OF MASSACHUSETTS.

The statutes of Massachusetts provide that on May 1st of each year every male twenty years old and upwards shall be assessed a poll tax, and this provision applies to unnaturalized males as well as citizens. In order to vote a man must be twenty-one years of age, be able to read and write, must have paid a poll tax within two years, and must have his name on the list of registered voters for the precinct wherein he casts his vote, and in which he lived on the first day of May of the year in which the election takes place.

From the returns of the polls in the various cities and towns made to the Secretary of State in May, 1889, and the return of the number

of registered voters and votes cast in each precinct at the State election Nov. 5, 1889, as shown by a statement made on March 12, 1890, by the Secretary of State to the House of Representatives, and printed as House Document No. 218 of 1890, the following figures are drawn:—

Counties.	Number of Polls.	Number of Registered Voters.	Number of Votes Cast.	Per cent of Registered Voters to Polls.	Per cent of Votes to Registered Voters.	Per cent of Votes to Polls.
Barnstable...	8,406	6,910	3,014	82.2	43.5	35.7
Berkshire....	21,075	14,828	11,397	70.3	76.8	54.0
Bristol.....	43,813	25,416	16,787	58.0	66.0	38.3
Dukes.....	1,267	1,061	530	85.3	49.0	41.8
Essex.....	76,715	50,990	37,927	66.4	74.3	49.3
Franklin....	10,577	8,354	5,610	79.0	67.1	53.0
Hampden	32,545	20,820	15,627	63.9	75.0	47.9
Hampshire ...	11,968	9,342	6,569	78.1	70.4	55.0
Middlesex....	107,348	70,409	53,714	65.6	76.6	50.2
Nantucket....	888	866	602	97.6	69.5	67.3
Norfolk.....	29,872	21,935	15,912	73.4	72.5	53.3
Plymouth....	24,742	18,410	11,399	74.0	61.8	45.7
Suffolk.....	130,032	73,854	56,697	56.7	79.4	45.0
Worcester....	74,483	48,827	36,067	65.5	73.8	48.3
Whole State..	573,721	372,042	273,873	64.8	73.6	47.7

Separating the cities from the towns we have

	Number of Polls.	Number of Registered Voters.	Number of Votes Cast.	Per cent of Registered Voters to Polls.	Per cent of Votes to Registered Voters.	Per cent of Votes to Polls.
Cities.....	342,725	212,274	159,080	61.9	74.9	46.4
Towns.....	230,996	159,768	114,792	69.1	71.8	49.6

And taking each county by itself,

Counties.	Number of Polls.	Number of Registered Voters.	Number of Votes Cast.	Per cent of Registered Voters to Polls.	Per cent of Votes Cast to Registered Voters.	Per cent of Votes Cast to Polls.
BARNSTABLE :						
Towns.....	8,406	6,910	3,014	82.2	43.5	35.7
BERKSHIRE :						
Cities.....	4,784	3,380	2,730	70.6	80.7	57.0
Towns.....	16,391	11,448	8,667	70.3	75.7	53.3
BRISTOL :						
Cities.....	32,174	16,837	12,226	55.7	72.6	40.4
Towns.....	11,639	8,579	4,521	73.7	52.7	38.5
DUKE :						
Towns.....	1,267	1,061	590	85.3	49.0	41.5
ESSEX :						
Cities.....	50,268	31,129	24,099	61.8	77.4	47.5
Towns.....	26,347	19,861	13,826	75.3	69.6	52.4
FRANKLIN :						
Towns.....	10,577	8,354	5,610	79.0	67.1	53.0
HAMPDEN :						
Cities.....	19,015	11,477	9,155	59.7	79.7	47.6
Towns.....	13,530	9,343	6,472	69.0	69.3	43.7
HAMPSHIRE :						
Cities.....	2,965	2,229	1,769	74.4	79.3	59.5
Towns.....	8,963	7,113	4,820	79.3	67.7	53.7
MIDDLESEX :						
Cities.....	65,277	39,950	32,073	61.2	80.3	49.1
Towns.....	42,071	30,459	21,641	72.1	71.0	51.2
NANTUCKET :						
Towns.....	888	866	602	97.6	69.5	67.9
NORFOLK :						
Cities.....	4,696	2,668	2,106	65.1	79.9	51.3
Towns.....	25,776	19,267	13,806	74.7	71.6	53.5
PLYMOUTH :						
Cities.....	7,115	4,696	3,406	66.0	72.6	47.9
Towns.....	17,627	13,714	7,991	77.8	58.1	45.3
SUFFOLK :						
Cities.....	128,075	72,500	57,798	56.6	79.7	45.1
Towns.....	1,967	1,325	899	67.7	66.9	45.3
WORCESTER :						
Cities.....	28,826	17,339	13,656	60.1	78.7	47.3
Towns.....	45,657	31,486	22,411	68.9	71.1	49.0

These figures show that in every county a larger percentage of the registered vote was cast in the cities than in the towns, while the ratio of the registered voters to the number of polls is in every county smaller in the cities than in the towns.

In the ten counties containing cities as well as towns the ratio

between the number of polls and the votes cast was in five of them larger in the cities and in five larger in the towns. In regard to the vote cast it must be recalled that 1889 was politically an "off year," and that the Australian ballot system was used in Massachusetts for the first time at that election.

There are two counties in which the distinction between urban and rural communities can be more sharply drawn than in any other; these are Middlesex and Worcester. By urban communities is to be understood in addition to the cities those towns whose interests are almost entirely manufacturing, and which have by far the greater number of inhabitants living in one or more compactly built villages within the limits of the town. Taking the figures for those two counties we have:

Counties.	Number of Polls.	Number of Registered Voters.	Number of Votes Cast.	Per cent of Registered Voters to Polls.	Per cent of Votes Cast to Registered Voters.	Per cent of Votes Cast to Polls.
MIDDLESEX :						
Urban.....	77,806	49,377	39,008	69.4	79.0	50.1
Rural.....	29,542	21,062	14,706	71.2	69.9	49.7
WORCESTER :						
Urban.....	51,990	38,021	26,356	68.5	76.7	48.7
Rural.....	22,498	15,806	10,692	70.2	67.6	47.3

To judge from the state census of 1885 this return of polls is too low throughout the state in general, so that if we take the ratio given in that census between polls and legal voters, we shall have as the total number of legal voters in the state a number less than the actual number. If, however, we assume that ratio to hold good, we get for the state as the total number of legal voters 447,100, and the percentage of the registered voters to the legal voters will be 83.2, and the ratio of the vote cast to legal voters 61.2 per cent; in other words, about 17 per cent of the voters of the state are not on the voting lists, and as may be seen from the first table over 26 per cent of those on the list fail to vote, so that nearly 39 per cent of the legal voters of Massachusetts failed to cast a vote for one reason or another. A consideration of the tables will show that the uncast vote is to be found, in a large measure, among the rural towns, and this vote is much of it brought out by the excitement of a national campaign. Whether the fact

that the tariff was made an issue in the state campaign of 1889 is in any degree responsible for the low percentages of votes cast in the eastern counties of the state, Barnstable, Bristol, and Plymouth, it is impossible to say. Similar returns do not exist for previous years as far as I know, so that no comparison can be made between years like 1889, when only state officers were elected, and years in which congressmen and presidential electors were chosen.

WALTER S. ALLEN.

FRENCH STATISTICAL ALBUM.

Album de Statistique Graphique de 1888. Ministère des travaux publics. Paris. 1889. Pp. x. Plates 22.

This is the tenth issue of the statistical album issued by the Ministry of Public Works of France. These albums have for their special end the graphical representation of statistics of railroads, internal and ocean commerce, and passenger transportation in Paris. Eight charts are devoted to the first subject, eleven to the second, and three to the last. Under railroads, for example, there are graphical charts illustrating gross and net receipts, number of passengers carried, tonnage, consumption of rails, development of railroads in the principal countries of the world from 1830 to 1880; and two very ingenious plates showing the shortening of time for various distances of travel in France during the past two hundred years, and the decrease in passenger rates of fare since 1798.

There are three principal methods employed in representing the statistics, based in almost all instances upon cartograms. These methods are: First, the use of lines on bands of different widths, to represent, for example, the gross and net receipts of railroads, the bands following upon the map the routes of the principal railroad systems; second, the use of circles, to show, for example, the gross receipts at railway stations. The circle is divided into as many sectors as there are roads running into the stations. Each railroad is represented by a conventional color, a light shade of this indicating the passenger receipts, and a dark shade the receipts from merchandise. A third method is the use of squares divided in much the same way as the circles.

The map, which shows the shortening in time of journeys to different parts of France, in the past two hundred years, is constructed on an ingenious plan. A large map of France indicates by proportional distances the length of journeys in time to different towns from Paris, by the diligence in 1650. Other maps of France are drawn within the first with Paris as a common centre, each representing a different epoch in the history of transportation; the radii from Paris to the several towns are constructed according to the same scale, depending upon the time spent. Thus we have a series of concentric maps growing smaller and smaller. To Havre the successive radii measured in hours are as follows: In 1650, 97; 1782, 52; 1814, 81; 1834, 17; 1854, 5.15; 1887, 4.10. Much improvement was evidently made before the introduction of railroads.

D. R. D.

MINOR NOTICES.

The first number of the *Annals of the American Academy of Political and Social Science* (July, 1890) which has just appeared contains matter of interest to students in the various departments of the broad field which the journal expects to occupy. A translation by Miss Jane E. Wetherill, of the official report of the Hungarian Minister of Commerce, upon the zone tariff in Hungary, as applied to railroad passenger rates, gives a very complete statement of the practical operation of this novel system of passenger fares. It is full of figures bearing on the subject, with an instructive comparison of the workings of the former and present systems. The influence of the price of tickets upon the amount of railroad traffic is clearly brought out. The most salient points of the report are summarized in an introductory note by Prof. E. J. James, which gives some interesting figures comparing the relative amount of the passenger traffic of railroads in different countries. It shows that the passenger traffic of American roads has received very little attention from railway managers, and that, despite the great fall in freight rates in the last thirty years, passenger fares are little less than they used to be. The article is an important contribution to the literature of transportation problems. Mr. Leo S. Rowe gives a statement of the "Instruction in Political Economy and Public Law in German Universities," a list of all

lectures delivered in the winter semester 1889-90. Preceding the list the writer has presented the main facts in tabular form, showing the number of instructors, and the hours per week given in the more important topics. By this means one may readily compare the relative strength in these departments of the various universities in the list. A comparison with American institutions would, if practicable, have lent an additional value to the article. Other leading articles of the number are "The United States and Canada," by Dr. Bourinot; "The Decay of Local and State Government," by Prof. Patten; "Wages and Interest," by Prof. Clark; and "The Province of Sociology," by Prof. Giddings. There are the usual book notices, together with other miscellaneous matter. The periodical publishes the proceedings of the Academy, and will appear quarterly. The editors are E. J. James, F. H. Giddings, and R. P. Falkner.

The prospectus of a new periodical, *Allgemeines Statistisches Archiv*, published by Laupp, in Tübingen, has been received. It will appear semi-annually under the editorship of the well-known Dr. Georg von Mayr. There is at present no periodical in Germany devoted especially to what they know as literary statistics, by which is meant the non-official work in the field, more especially the discussion of general theories and the interpretation of official results. This is the field which the new enterprise proposes to occupy. It will offer an opportunity for the publication of essays bearing on the general theory of statistics, and its relations to other forms of knowledge, besides more technical discussions of the methods to be employed in statistical work. The main feature of the work is, however, to be an attempt to popularize the results of official investigations. With the least possible use of the extensive tables which deter from the use of official documents, it is hoped to present the substance, the main relations, and the principal points of view of such publications in the form of readable essays. By such means an effort will be made to bring the work of statisticians within the reach of general readers. Such an experiment must attract attention. The first number for 1890 is promised in the course of the summer.

Atlas of Commercial Geography, illustrating the general facts of physical, political, economic, and statistical geography on which international commerce depends. By John George Bartholomew. With introductory notes, by Hugh Robert Mill. Cambridge University Press. 1889. Pp. viii. Maps 27.

The introduction states that the contents have been arranged mainly with a view to educational utility. The general maps, constructed either on Mercator's projection or on Gall's stereographic projection, show heights and depths, ocean currents, mean annual rain fall, prevailing winds, condition of climate, distribution of mineral, vegetable, and animal commodities, diseases, density of population, chief races of man, religious, isochronic distances, postal systems of the world. Special maps are also given devoted to separate countries. Although the maps are not novel in conception, it is rarely that so large a number of suggestive interest are brought together in so convenient a form.

Fourth Annual Report of the Factory Inspectors of the State of New York. January, 1890. Albany. Pp. 329.

Some conclusions are offered in regard to the operation of the recent law for restricting the hours of labors; and there is the usual discussion concerning the employment of children, railways and elevators, fire escapes, etc. The total number of accidents in manufacturing establishments was 647 against 630 for the preceding year. 56 were fatal. The proceedings of the third annual convention of the Internal Association of Factory Inspectors of North America, August 6-9, 1890, is included.

In a paper upon the *Restriction and Prevention of the Dangerous Communicable Diseases*, by Henry B. Baker, M.D., Secretary of the State Board of Health of Michigan, there were several interesting and valuable statistical tables upon "Life Saving" in Michigan. The conclusion is that the record shows a saving of over one hundred lives per year from small-pox, four hundred lives per year saved from death by scarlet fever, and nearly six hundred lives per year saved from death by diphtheria,—an aggregate of eleven hundred lives per year, or three lives per day saved from these three diseases. The article is illustrated by diagrams.

Annali di Statistica. Saggio di Bibliografia Statistica Italiana. Terza Edizione Accresciuta. Ministero di Agricoltura, Industria, e Commercio. Rome, 1890. Pp. xix, 213.

The first edition of this bibliography of Italian statistical literature was published in 1883, with an introduction by Dr. L. Bodio. The introduction is reprinted in this, the third edition. The bibliography is arranged by topics, and testifies to the diligence and wide range displayed in statistical inquiries by Italian students and their government.

Fifth Annual Report of the Board of Gas and Electric Light Commissioners of Massachusetts. January, 1890. Boston. Pp. 207.

The attention of students of municipal administration may well be directed to the reports of the Gas and Electric Light Commissioners of Massachusetts. No other American state publishes such reports, and even the returns made by the English gas companies to the Board of Trade, and published among the parliamentary papers, are very meagre as compared with these. The distinguishing part of this particular issue is the article on water gas. The returns from electric light companies are also much fuller than ever before. Incidentally the Board has collected and published a record in regard to the deaths in 1889 of 107 persons throughout the United States from inhaling illuminating gas. The statistical records are very full, furnishing comparative data concerning 75 gas companies and 100 electric light and power companies. The data cover such points as capital, number of stockholders, stockholders resident in Massachusetts, receipts, expenses, dividends, price of gas, etc.

Second Report on the Custody and Condition of the Public Records of Parishes, Towns, and Counties. By Robert T. Swan, Commissioner. Boston, 1890. Pp. 45.

The first Report issued in 1889 was briefly noticed in Number 7. The second contains the record of the work of but five months, much of which is of a preliminary character. Further inquiry has been made in regard to the keeping of town records. Thirty-two towns are reported as having either a worthless or no safe whatever, and fifty-two as not having sufficient safe room for all records and papers. The records of assessors and collectors are most neglected. There is an interesting discussion as to the merits of the type-writer for copying and preserving records. The verdict on the whole seems to be favorable.

Third (1889) Annual Report of the Board of Mediation and Arbitration of the State of New York. Albany, 1890. Pp. xii, 437.

Special Report on the New York and Brooklyn Surface Railroad Strike. Pp. 188.

This contains a statement of the most important labor disputes from Nov. 1, 1888, to Oct. 31, 1889. It is stated that there was a marked diminution in strikes and lockouts in 1889, and that there is a growing acceptance of arbitration as a method of settlement. The report would be more helpful if there was a detailed index, or if the material were summarized in some particulars in a tabular form.

MISCELLANY.

STUDY OF STATISTICS IN COLLEGES.

The following paragraphs are taken from an article on *The Study of Statistics in Colleges and Technical Schools*, by President Francis A. Walker, published in the *Technology Quarterly* (Boston), Feb., 1890.

* * * * *

The three uses of statistical study, aside from its value as a means of discipline, are, in their order from lowest to highest, as follows:—

First, to enable the student to detect the fallacies in conclusions drawn by others from quantitative statements concerning human affairs, actions, interests, in which adventitious elements lie concealed, or from which something essential, or at least relevant, has by inadvertence or dishonest design been excluded.

Secondly, to enable the writer or the speaker upon politics, economics, history, or sociology safely and effectively to illustrate and emphasize his conclusions, drawn from a study, itself perhaps mainly or wholly non-statistical, of the subject to which he devotes himself.

Thirdly, statistics may, under proper direction and with due safeguards, be used for the discovery of social laws.

The first of these objects could perhaps only be fully attained through those long and weary stages of training which would be required to qualify one for the highest exercise of the statistical faculty, as last stated; but a very large part, at least, of the result desired can be reached by a little very elementary instruction. To take an illustration from another department of study, we may suppose that an adequate course in logic, sufficient to make a man, otherwise well trained, a sound and accomplished reasoner, might be compassed in a certain number of exercises per week, continued through two academic years. Yet, if time be not afforded for such a course, a great deal might be done to enable the student to detect false conclusions on the part of others, and to save him from the grosser errors of reasoning in his own writing or speaking, by means of a dozen hours devoted to fallacies. In much the same way, if a full course in statistics cannot be given, a few exercises upon the abuses of statistics may at least serve to keep one for life from a certain class of blunders from which men of the greatest acuteness and learning might not otherwise be exempt.

Let us take an illustration of the sort of errors against which the merest elementary study of statistics might prove a sufficient protection. A meritorious writer adduces as a proof of the great fall of prices which took place in New England between 1630 and 1640

that a cow which, at the former date, was worth £25 to £30 would, at the latter date, have brought but £5 to £6. Now, the bare facts here are not in dispute; nor is it to be questioned that a fall, a great fall, in prices did take place in New England during the period referred to. Yet the statement quoted contains a gigantic blunder,—a blunder which a student of statistics would probably be incapable of making. In 1630 the value of a cow in New England represented the immense cost and risk of bringing an animal, by a slow-sailing vessel, thousands of miles, through comparatively strange seas, into a foreign climate. Ten years later, the value of a cow represented only the cost and risk of rearing her upon the soil. The cow of 1630 might still be living, surrounded by ten, twenty, or fifty of her descendants, born in New England.

Errors of this type are countless. They occur in the writings, they are heard in the speeches, of men learned and otherwise acute, but who have never been trained to detect the fallacies that lurk so cunningly under all groups of figures. Volumes might be filled with instances of statistical blunders of a class which a very elementary course would forever render impossible to any careful writer or speaker. Such a course would embrace a host of illustrations, affording examples of the kinds of error which especially beset the use of figures for sociological purposes, and would direct the attention of the student to the best means of exercising care and pains in escaping them.

It is easy to say that, if statistics be in truth such "kittle cattle," if danger lurk thus under every group of figures relating to social and economic matters, it would be better to eschew statistics entirely. But mankind will not consent to give up an agent of such power, because of the abuses to which it is subject. If all men at once honest and candid were to forbear to employ statistics in such discussions, least peradventure they should lead some astray, we may be sure that all the dishonest and uncandid would resort to their tables and diagrams with redoubled zeal. There are few instincts more strong than that which urges men to give a quantitative expression to the results of human experience. Men will do it, or have it done for them by others. No warning as to the possible errors of such evidence can prevent this appeal, or diminish the eagerness with which it will be made. What we must needs do, if we will promote the truth, is to instruct and exercise the citizen, as far as we may, in the scrutinizing, sifting, and testing of alleged statistical proofs.

* * * * *

We cannot all be Cobdeus, Gladstones, or Wellses; but every educated man can learn to construct tables and diagrams which will bear the test of a fair scrutiny and liberal criticism. To do aught in the way of statistics at which fools will not peck is of course beyond any man's power.

Those who have never tried their hand at statistical work will fail to appreciate the difficulties to be encountered at the start, and the frequently recurring need of going back and beginning all over again. To go to a series of extended tables with multitudinous subdivisions, in which a given total is distributed among many classes, and to take therefrom just what you want, no more, no less, and no other,—to make sure that your parts when put together will form a whole, and that no direction conveyed by the heading of a single column has been neglected,—is a task for which men must be trained, and in which they must be practised, going from simple and easy examples to complex and difficult ones by patient steps. The great majority of editors and writers for the press, the great majority of legislators and public speakers, either fail on such work, or, as is most likely, judiciously avoid the attempt, even though statistical matter altogether relevant to the subject, and which might be made most interesting to their readers or hearers, lies on every side of them. In my long experience in office at Washington, nothing struck me more forcibly than the helplessness of Congressmen—even, with few exceptions, the acutest and best trained—to get up the figures for their own speeches. No matter how clear their conception of the positions they wished to present, few of them could readily and confidentially resort to the government publications at hand for the statistical materials with which to illustrate and enforce their views; and the gratitude with which they would accept and acknowledge some trifling assistance from a well trained clerk was almost ludicrous. I do not intend any disparagement by this statement. Statistics have a language of their own, and he who would use them must first learn that language; and this is as yet taught scarcely anywhere.

A striking example of the liability to mistakes which constantly besets the compilation of statistical tables was afforded in a book published, some years ago, under the title, "The Statistics of the United States." The plan of the work was a good one; such a book was needed; but the author evidently had not had the training requisite safely to carry out his scheme without falling into the gravest errors. For instance, the work undertook to present the expenditures of the United States for each year since the formation of the government. The figures used were taken directly from the finance reports of the Treasury Department, and were hence of the highest official authority. Unfortunately, however, the compiler went for this purpose to the column of "Gross Expenditures," and transferred the figures he found there into his table. The result was that for some years he was out of the way by several hundreds of millions of dollars, since during these years the Treasury issued large loans to pay off other loans contracted during the war at high rates of interest. Thus, for 1868 this writer gave the expenditures of the government as \$1,093,079,655,—a very expensive government indeed for a time of profound peace! The facts were as follows. The "net ordinary expenditures" of

the government that year were \$202,947,734; there was paid from the Treasury, in bond premiums, \$10,813,349; and, as interest on the national debt, \$143,781,592; making the total expenditures of the government on these accounts, \$357,542,675. In addition, the Treasury redeemed bonds to the amount of \$735,536,980; and this, mainly, out of the proceeds of fresh loans, at lower rates of interest. All this vast sum, more than twice the actual expenditures of the government, even after including bond premiums and the current interest on the public debt, was embraced in the financial statement of the last year of Mr. Johnson's administration. This mistake was committed in connection with each successive administration, from Washington's down.

It is needless to say that blunders of such a magnitude completely destroyed the prestige of the book; and that, although it was intended to be issued from time to time, with the facts and figures brought down to date, it was never heard of again.

Another example of statistics rendered actually delusive by the neglect of elementary considerations is found in a recent work on State and Municipal Taxation, a book which, in many of its views and suggestions, makes a valuable contribution to economic literature, but is, statistically, very faulty. Thus, in a "comparative table," showing the "principal receipts, total receipts, and total expenditures" of certain leading cities, New York is put down for \$73,309,884 of total receipts, in 1886, and for \$71,750,743 of total expenditures. Now the fact is that nearly twenty millions alike of the receipts and of the expenditures represent nothing but temporary loans, contracted and paid during the year. City taxes come in mainly during a brief period. In order to prevent the necessity of keeping a vast sum of money in the treasury for months together, the government properly borrows in the "dry season," and liquidates its obligations when the taxes set in like a flood. Yet this fact was, in the work referred to, allowed to swell the expenditures of the city more than one third. Had the city treasurer found it expedient to borrow ten millions more for one, two, or three months, this would have carried the "expenditures" of New York up to eighty-one millions!

THE FIRE LOSSES IN THE UNITED STATES DURING 1889.

HOW DISTRIBUTED BY STATES AND SECTIONS, CAUSES AND DIVISIONS OF THE YEAR.

The following is an abstract of the review of the fire losses in the United States during 1889, appearing in *The Chronicle Fire Tables*:

The destruction of property by fire in the United States in 1889 was greater than in any other year since the great fires in Chicago and Boston.

The number of noteworthy fires in the United States in 1889, not

including the smaller ignitions with merely nominal losses, was 17,598, an increase of 1,579 fires over 1888. The value of the property destroyed by these fires was 123.0 millions against 110.9 millions in 1888, an increase of 12.1 millions. The average property loss per fire was \$6,992. In preceding years the average losses per fire were as follows: in 1888, \$6,922; 1887, \$7,330; 1886, \$6,760; 1885, \$7,285.

The geographical distribution of the fire waste in 1889, compared with 1888, was about as follows: in the New England States 16.8 millions against 12.9 millions in 1888; in the Middle States 27.4 millions against 33.1 millions in 1888; in the Southern States 18.8 millions against 16.5 millions in 1888; in the Western States 35.8 millions against 35.8 millions in 1888; in the Pacific States and Territories 24.2 millions against 12.9 millions in 1888. It will be seen that the fire loss in the New England States in 1889 was considerably heavier than in the preceding year, while in the Middle States the loss was much lighter than during the year before. In the Southern States there was a moderate increase, while in the Western States the sum destroyed was almost exactly equal to the destruction by fire during 1888. Excessive losses occurred in the Pacific States and Territories, the destruction in this section having been about twice as great as in the preceding year, chiefly owing to the sweeping fires in the new State of Washington.

The loss in the first quarter of 1889 was 27.3 millions against 34.4 millions in the first quarter of 1888; in the second quarter 33.1 millions against 26.7 millions in 1888; in the third quarter 28.6 millions against 26.5 millions in 1888; in the fourth quarter 34.0 millions against 23.4 millions in 1888. Therefore, the largest loss in 1889, by divisions of the year, was in the fourth quarter, whereas in 1888 the largest loss was in the first quarter of the year. The statistics of fifteen years show that the highest average losses occur in the first and fourth quarters.

The loss in 1889 on property in which fires originated was 72.7 millions against 78.9 millions in 1888. The loss by exposure in 1889 was 50.4 millions against 31.9 millions in 1888, showing a large increase, attributable, of course, to the numerous sweeping fires. The causes of 8,490 fires were fairly well known, but the causes of the remaining 9,108 were either not reported at all or stated to be unknown.

Owing to the incompleteness of the reports, the study of fire causes is very unsatisfactory. No particular effort is made by the public authorities to ascertain the actual causes of fires, taking the country as a whole. In some of the larger cities there are municipal officers whose duty it is to investigate the origins of fires, but their labors, however conscientiously performed, contribute very little toward the enlightenment of the people with regard to the causes of fires in the country at large. Even the officers of fire insurance companies and

of fire underwriters' organizations are sometimes very reluctant to assign causes for fires which come under their notice.

We have shown that the average loss per fire last year was \$6,992, which is another way of saying that the community lost that amount of money about every time a fire occurred. The average loss varies but little year by year, consequently every genuine alarm of fire during the current year will mean an absolute loss to the people of the United States of about seven thousand dollars. Undoubtedly the time will come when the county or city authorities will be compelled by law to investigate the causes of fires or special officers appointed to give their entire attention to this purpose. When that time arrives the causes of the tremendous destruction by fire which is continually going on will be much better understood, and probably a very large proportion of the present fire waste will be prevented. No one can reasonably expect that anything will be accomplished in the way of fire prevention until the causes of fires and of the heavy losses thereby are better known. Meantime it is fortunate that the productive power of the people is so vast that 128 millions of accumulated wealth can be wiped out of existence in a single year without surprise or protest, and it is high testimony to the perfection of the insurance system that these mammoth losses are so evenly distributed that they fall lightly on the many instead of onerously on the few.

How little is really known of the origins of fires is rendered evident by the fact that of the 128 millions consumed last year we have but a partial idea of how 79.7 millions came to be destroyed, after counting in the great loss (over fifty millions) through exposure. Of the 72.7 million dollars' worth of property destroyed by fires originating on the premises, specific causes can be assigned for the loss of only 29.4 millions, leaving a property value of 43.3 millions which was swept away by fires that started in some unknown manner.

The principal known causes of fires are as follows in order of rank: incendiarism, defective flues, sparks (miscellaneous and locomotive), matches, lamp explosions, stoves, spontaneous combustion, lightning, lamp and lantern accidents, gas jets, forest and prairie fires. These eleven causes were responsible for 6,223 fires, or 73 per cent of the whole number of fires of known origins. The remaining 2,267 fires of known origins were divided among forty-seven lesser causes.

Nearly twenty-three per cent of the fires of known origins were reported as incendiary. The proportion of incendiary fires in 1888 was about twenty per cent; in 1887 about twenty-one per cent; and in 1886 about twenty-six per cent. In Tennessee, West Virginia, and Wyoming more than one-half the fires were said to be of incendiary origin. In eighteen other states, viz., Connecticut, Delaware, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisiana, Texas, Indiana, Iowa, Nebraska, Kansas, Idaho, and Washington, the causes of thirty-five to fifty per cent of the fires were similarly reported.

One of the interesting features of the fire loss in 1889 is the falling off in the number of fires attributed to defective flues. Perhaps the remarkably mild weather of the past winter explains this phenomenon. During the winter months defective flue fires are of frequent occurrence, especially in the coldest weather. In an unusually mild winter — such, for example, as the winter of 1889-90 — the defective flue hazard is probably considerably lessened.

At this moment there are no causes of fires which are being more closely studied than electric wires and lights. Within four years the value of the property annually destroyed by electric wires and lights has risen from less than one-half million dollars to more than five and one-half million dollars. During the year 1889 electric wires were charged with their first great conflagration, viz., the Kingston Street fire in Boston, Mass., on November 28, 1889.

In the fifteen years during which *The Chronicle* has kept its careful record of fires *one thousand three hundred and sixty-five million dollars'* worth of property has been destroyed by fire in the United States. The magnitude of this sum is almost beyond comprehension. Through the system of fire insurance the people have taxed themselves to relieve the misfortunes of the direct sufferers, and have repaid to the latter in this manner nearly *seven hundred and sixty-nine million dollars*. The loss of the remaining five hundred and ninety-six millions was borne by those whose property went up in smoke without succor of any kind. How many hundreds of these millions were destroyed by criminal fires, how many hundreds of millions by a carelessness that was akin to criminality, how many hundreds of millions by a careless and ignorant construction cannot be precisely stated. Most fire underwriters would probably consider an estimate that one-fifth of this great property loss in fifteen years, or about two hundred and seventy-five million dollars, was caused by incendiarism and arson, as far below the fact. Yet, on the basis of the apparent percentage of incendiarism in 1889, much more than two hundred and seventy-five million dollars of property values were consumed in the United States within a period of fifteen years by the torch of the incendiary.

NEW FRENCH MORTALITY TABLES.

In the Economic Section of the "World's Fair," held at Paris last year, were exhibited two important tables of mortality. These are the joint production of the four French companies, Assurances Générales, Union, Notionale, and Phénix. The preparation of these tables must be regarded as an event of great importance in the history of vital statistics. We are not aware that anything on the same scale has ever before been attempted in France, and offer our sincere congratulations to the life assurance world across the channel on this their recent achievement. The tables are two in number. The first

of them represents the mortality which has been experienced among the annuitants of seven companies, namely, the Caisse Paternelle, Urbaine and Monde, and the four companies which have been associated in the preparation of these statistics. To designate this table, the symbol R F (Rentiers Français) is employed. The observations embrace the experience of the seven companies from 1819 to 1878 (should this be 1888 ?), and it will be useful to set before our readers a few figures for the purpose of comparing the extent of the observations with those on which Mr. Finlaison's government annuity tables of 1883 are based. The total number of lives under observation is 40,328, of whom 16,927 are men and 23,401 women. The men have supplied 149,377 years of life and the women 227,370. Mr. Finlaison's tables relate to 10,929 men and 19,859 women, so that in France the proportion of male to female annuitants is decidedly greater than in England; at any rate, if the comparison of the R F with the government table of 1883 is a fair one. In the English table the number of years of life is decidedly greater in proportion to the number of lives observed. The second table relates to the lives assured in the four associated companies under policies written between the years 1819 and 1888, and a comparison is instituted between this experience and that of the institute of actuaries' experience, healthy males and females combined. This second table is denoted by A F (Assurés Français). 229,143 lives are included in the observation of the A F table, being about fifty per cent in excess of the lives included in the institute of Actuaries Hmf. Of the French lives about one-quarter are women. With the assured lives, as with the annuitants above referred to, we find that the average duration of the observation per life is decidedly greater in the English table than in the French. While in the French table of assured lives the total number of years of life is 1,790,783, as compared with 1,350,762 in the English table; yet, on the other hand, the deaths in the French table—namely, 22,621—are 1,235 less than in the English table. This is a somewhat curious result, and perhaps has its origin in the fact that in France the average age at entry is less than in England.

We are informed in a short preface to the pamphlet containing the tables that the rates of mortality have been obtained by a double adjustment after Woolhouse's method. These researches, conducted under the auspices of the four French companies into the mortality prevailing among the French annuitants and assured lives, are not complete. In the present publication we have merely given the rates of mortality of the lives taken as a whole, and in the table of annuitants there is no separation of male and female lives. On completion of the work now in progress, having for its object the determination of the mortality, as affected by the duration of the contracts, the complete results will be published, together with a detailed description of the methods on which the investigation has been conducted. These tables will, no doubt, prove of great interest for the life assurance world, and their publication will be eagerly awaited by British actuaries.—*The Insurance Record*, London.

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STATISTICS OF THE COLORED RACE IN THE UNITED STATES.

BY PRESIDENT FRANCIS A. WALKER.

It is to the now defunct institution of chattel slavery that we owe the existence of one of the most important elements of our population,— the colored race.

The past history of this race within the United States is of deep, though painful, interest; while its future forms a subject of puzzling speculation, inasmuch as the question presents itself with much force, whether an element brought hither, in the first instance, compulsion, without any deference to, or consideration of, the motives which urged hither the original white settlers of this coast, or any subsequent body of colonists, can be maintained in its entirety and kept up to its relative importance, against the social and economic competition of the other elements of the population, now that the institution of chattel slavery has been violently broken down and the blacks have been, almost by act of war, placed in a state of legal equality.

I have said that it is to slavery we owe the presence of the African, in any considerable numbers, upon our shores. It is estimated that the Slave Trade has, first and last, taken from

Africa 40,000,000 of her people. How many of these contributed to the present negro population of the United States? The usual estimates of the importation of black slaves into the British Colonies prior to 1776 make the total number 200,000. The survivors and the descendants of these were computed to amount, at that date, to about 550,000. These estimates are, however, very rudely made. Even after the establishment of the present form of government and the inauguration of the series of national censuses we find Dr. Seybert lamenting that so little attention was paid to the blacks in the enumeration, on account of their being regarded solely as a species of property, without any consideration of the various sociological interests concerned with the facts of their numbers or their condition.

The occurrence of the Revolutionary war caused great disturbances among the colored people of the insurrectionary states, especially at the South. As the contending armies dragged their trains and camps alternately over the face of Virginia, the Carolinas, and Georgia, great numbers of slaves accompanied Tory masters, as these became refugees; great numbers deserted patriot masters for the more luxurious service of British officers, or to become camp followers of the redcoats. So much is known. It is also to be conjectured, almost with certainty, that the rate of mortality among this portion of the population was considerably increased through the hardships of the protracted war, and that the importation of slaves was somewhat checked by the condition of things existing between 1775 and 1783.

It was this depletion of the normal supply of slave labor through the effects of war which gave weight to the demands of the representatives of the planting states, in the Constitutional Convention of 1787, that their communities should be allowed a moderate period in which to replenish the slave markets before all further importations should be cut off by Constitutional inhibition. They argued that their labor system had been inherited by them; that, it being what it

was, their constituents were suffering from losses (of this species of property) which had been brought upon them by their devotion to the common cause of all the states — independence of Great Britain — and that they should not be punished for their patriotic endeavors.

It was in consequence of representations like these that the Constitution of 1787 was made to contain a provision that the power of Congress over commerce with foreign nations should not be exercised to prohibit the importation of slaves prior to 1808, twenty years, that is, from the year in which it was anticipated the Constitution would be ratified.

The first census, 1790, discovered the number of colored persons in the United States to be 757,208, of whom 59,527 were free, the latter number being about equally divided between the free states and the slave states, the free blacks of North Carolina being 4975; of Virginia, 12,866; of Maryland, 8043; of Delaware, 8899.

The colored element at this census constituted a larger proportion of the population than ever after, viz., 19.3 per cent.

By 1800 the colored element had increased absolutely to 1,002,087, being a gain of 32.38 per cent; but had declined relatively to 18.9 per cent of the entire population. The free colored had risen to 108,485.

By 1810 the colored element had reached 1,377,808, a gain of 37.5 per cent upon its own numbers in 1800, and of 81.96 per cent upon its own numbers in 1790. It had, also, advanced slightly towards its former share of the total population of the country, being now 19 per cent of the whole. The free colored had risen to 186,446. The admission of Louisiana brought in nearly 50,000 colored persons, of whom six-sevenths were slaves.

One cause of the increase in the colored population of 1810 over 1800 had been the stimulation of the slave trade, due to the near approach of that date on which, to the honor of the American name, it became a thing forever after prohibited, — a felony, and, by statutory definition, piracy.

I have tried in vain to secure reliable information regarding the importation of slaves, under the permission of the Constitution, between 1790 and 1808. Mr. H. C. Carey, in his work "A History of the Slave Trade," puts the number at 90,000; but I have been unable to ascertain that Mr. Carey had sufficient data for the construction of more than a highly conjectural estimate. The only positive source of knowledge appears to be the customs records of the port of Charleston, S. C.

By 1820 the number of the colored had risen to 1,771,656, a gain of 28.59 per cent in ten years, of 76.8 per cent in 20 years, and of 188.97 per cent in 30 years. Its share in the total population of the country had sunk to 18.4.

By 1830 the number of the colored had increased to 2,328,642, a gain of 31.44 per cent in 10 years; of 69.01 in 20 years; and of 182.89 in 30 years. Its share in the total population had still further sunk to 18.1. The acquisition of Florida had added 16,845 colored, against 18,385 whites.

By 1840 the numbers of this race had risen to 2,878,648, a gain of 23.4 per cent in 10 years; of 62.2 per cent in 20 years; and of 108.57 per cent in 30 years. The number of free colored was then 886,298, being 18 per cent of the total colored. The share of the colored element in the total population of the country had fallen to 16.8.

By 1850 the number of the colored had risen to 3,638,808, a gain of 26.63 per cent in 10 years; of 56.26 per cent in 20, and of 105.89 per cent in 30 years. This element then contributed 15.7 per cent to the population of the country.

The acquisition of California, Texas, New Mexico, and Utah during the above period had added 331,611 whites and 59,799 colored to our population, the two elements in the new territory having about the same numerical relation as throughout the United States at large.

The next step brings us to the threshold of the war which wrought such tremendous changes in the condition and prospects of the colored race in the United States, and which at

a blow destroyed that relation which alone could have induced the presence of any considerable body of Africans upon our soil.

In 1860 the number of the colored had risen to 4,441,880, being a gain of 22.07 per cent in 10 years, of 54.57 per cent in 20 years; and of 90.74 per cent in 30 years. The proportion of this element to the total population was 14.1 per cent; that is, one-seventh of the inhabitants of the United States were then colored. The free colored were 488,070.

Four years of war ensued. Had Congress, in an enlightened view of the immense importance of ascertaining precisely where that great struggle left us, provided for the taking of a census, in 1865, with improved modern machinery of enumeration, we should have obtained results of almost priceless value. Unfortunately, however, the attention of our politicians was fixed on matters of very much less consequence. Not only was no special enumeration resorted to in 1865, but when the time approached for taking the ninth census, in 1870, the Senate rejected a bill, prepared chiefly by the labors and services of Gen. Garfield, which had passed the House of Representatives by an immense majority.

The country was thus thrown back upon the existing law regulating the enumeration, a law which had always been defective in its provisions, but which had become as inadequate to the work requiring to be done in 1870 as the old smooth-bore, muzzle-loading Queen's arm of the Revolution would be to meet the demands of modern warfare. Bad, however, as was the law, the political situation greatly aggravated its defects. The South was then in a state of intense agitation; portions of it almost in a race-war; the Kuklux outrages were at their height on the one side, while the carpet-bag governments, sustained by federal force, were doing their worst to alienate all friends of law and order, of public decency and public honesty.

It was in such a situation that the Census of 1870 was to

be taken; and, instead of entrusting the local supervision of this important work—a work requiring in an eminent degree the confidence and the cheerful co-operation of all classes and all parties—to persons specially appointed for the purpose, chosen for their supposed fitness for the task, and so chosen as to win popular support to the enumeration, instead of this the local supervision of the census in the Southern states was, by the defeat of Gen. Garfield's bill, thrown back into the hands of the Marshals of the United States Courts: officers thoroughly identified, at every point, with the party and race struggles that had convulsed society from 1865 to 1870; officers necessarily unpopular in an intense degree, even if through no fault of their own, among the most enlightened and normally influential portions of their several communities; officers appointed for another purpose, and amenable to a different department from that to which the census is assigned; officers chosen without the slightest reference to their capability for, or their interest in, statistical work; officers, some of whom were intelligent, honest, and patriotic, some of whom, like too many federal officials at the South during the period in question, lacked one or more of these qualifications; officers, every one of whom, if he had possessed otherwise all the qualifications that could be desired for such a service, had enough, and more than enough, in the way of his regular duties, in the enforcement of the revenue and other laws of the United States, in those troubled districts, in those troublous days, to occupy every moment of his time from January to December. And, as the Census Office had no part in the selection of these prime agents, so it had no part in the selection of their subordinate agents, the so-called Assistant Marshals, the actual enumerators of the population. Not even a veto could be exercised at Washington.

Good, actually good, appointments were not even to be expected as a general thing. The whole battle against the Garfield bill had been fought on the question of patronage.

It was for the avowed purpose of retaining this large body of more or less lucrative appointments in the hands of the dominant party that the United States Marshals rallied in Washington, during the winter of 1869-70, to defeat the House measure. They wanted to use these thousands of offices as a means of strengthening their hands in their respective districts, to fight the Kuklux and the illicit distillers; to build up the republican party and consolidate the negro vote. And, in general, this was precisely the use to which those offices were put. Some Marshals, especially in states which had a large and respectable white republican vote, as in Virginia, West Virginia, Kentucky, Tennessee, North Carolina, and Missouri, found it compatible with party interests to appoint intelligent enumerators; and in some districts the work was as well done as in any at the North or West. In other districts, where the newly enfranchised negroes constituted 40, 50, 60, 70, or even 80 per cent of the population, and where the whites, with a few insignificant and often disreputable exceptions, were banded together within the democratic party, the power of appointment was exercised to the inexpressible injury of the census service. Negroes who could not write or read were selected for this difficult, delicate, and responsible duty. Accompanied, perhaps, by some poor white man, with such clerical accomplishments as might be expected, these officers of the law pushed their way into mansions where their intrusion was resented as an insult, or sought to traverse the bridle-paths of extensive districts—districts three or four or five times as large as could properly be assigned to single officers—to find the hundreds and thousands of log-houses in which the poorer part of the population, white or black, found shelter.

No one who is familiar with the conditions of life at the South will hesitate to admit that it would be a work of the greatest difficulty for a man of more than average intelligence, with an instinct for topography and a fair knowledge of woodcraft and accustomed to the saddle, to traverse a dis-

trict containing 400 square miles, in a broken and wooded country, and not, in spite of the utmost diligence and fidelity, fail to come upon scores of cabins, hidden away in ravines, or in the depths of forests, often without so much as a bridle-path leading up to the door. It would often be no small task to find such a cabin, even if you knew it was somewhere in the neighborhood, and were specially looking for it and for it alone. The chance of missing it, when you had no information of its existence, and were only looking around for human abodes in general, would be very great indeed.

But why protract the miserable story of a most difficult, delicate, and important work sacrificed to the maintenance of carpet-bag governments, or to the exigencies of the judicial department in its contest with the Kuklux and the illicit distillers, or to even less creditable purposes of party managers. The result was an enumeration which we now know from indisputable evidence to have been in many parts of several Southern states inadequate, partial, and inaccurate, often in a shameful degree.

The number of colored persons returned in the Census of 1870 was but 4,880,009, a gain of only 9.86 per cent in 10 years; 34.11 per cent in 20 years, and 69.82 per cent in 30 years, leaving this element but 12.7 per cent of the total population.

The reason why so great a reported falling off, not in the colored population absolutely, but in their previously sustained ratio of increase, did not excite incredulity, did not arouse challenge, was the intervention of the war since the Census of 1860, a cause that seemed potent enough to account for almost any effect. This country had had no previous experience of a long desolating war within its borders to furnish any measure of the possible influence of such a force. It was not in the nature of the case unreasonable that the ratio of increase in this element of the population should have fallen off from 22.07 per cent between 1850 and 1860 to 9.86 per cent between 1860 and 1870. The slaves

had first been declared property contraband of war; and unknown numbers of them had escaped through the Confederate lines, or had followed the march of our armies, to become camp followers, or to herd miserably in cities and contraband camps, where the rate of mortality was known to be fearfully high, as anyone can see for himself by looking at the cemetery at Arlington, near Washington. Then the slaves had been declared free; and it was not irrationally argued that, wholly unaccustomed to care for their own wants, or to direct their own movements, the negroes had, when once the control of their masters was withdrawn, pursued courses and suffered hardships which had not, indeed, actually reduced the numbers of this people, but had sharply checked their rate of increase. Still again, it was credibly asserted that child-bearing had been associated in the minds of the negroes with slavery; and that, freed from the dictation of their former masters, and revelling in an unaccustomed freedom of movement and of indulgence in social and convivial life, the women of this race had diminished the birth rate purposely.

All these considerations are so perfectly rational in themselves, and coincided so well with the reports from the few Southern cities in which the registration of births, marriages, and deaths was maintained (the number of deaths among the colored population being reported often as high as 40 or 50 in 1000) that the figures for the colored population which were put forth in 1870 met with little or no serious challenge, but were generally accepted as representing, at least approximately, the facts of that year.

The Census of 1880, however, revealed unmistakably that the count of the colored population, in 1870, had been defective in several states, especially those which, like South Carolina and Mississippi, contained a very large excess of the colored element. This became evident from the first collocation of the figures of the Tenth Census; and local examinations, at the points where the greatest discrepancies

existed, proved conclusively that the Assistant Marshals of those districts, at the Ninth Census, had shamefully slurred over their work.

The count of 1880 showed 6,580,793 colored, an apparent gain over 1870 of 84.85 per cent; a gain — undoubted — of 48.15 per cent in 20 years, and of 80.85 per cent in 30 years.

For a time the spirit of party led some to contest the count of 1880; but the further investigation was carried, the more manifest it became that this count was essentially correct, and that the fault lay with the Census of 1870.

The reason for better work at the later date was found not merely in the restoration of peace, order, and comparative harmony throughout the lately disturbed section, together with the awakened interest of all classes of people in whatever might concern their social and industrial progress. That reason was found in a much higher degree in what might have been had just as well as not in 1870, viz., in sound provisions of law for the conduct of the enumeration.

By the Act of 1879, which was mainly based upon the Garfield bill of 1869-70, the supervision of the census was taken away from the Marshals of the United States courts and vested in Supervisors, appointed simply with reference to this service, and selected on account of their presumed qualifications therefor. These Supervisors gave, as a rule, their entire time for from five to eight months to the organization and conduct of this work. The Supervisors of 1880 were two and one-half times in number the Marshals of 1870, so that, with far more time at his command, each Supervisor was called to overlook a much smaller field. Supervisors were appointed from either political party, with the utmost impartiality. And, as they were themselves selected without regard to partisan services, they were officially instructed that it would be considered an offense and an abuse of trust if in their own appointment of enumerators they allowed partisan motives to appear. The enumerators of 1880, who succeeded to the work of the Assistant Marshals

of 1870, thus freed from supposed obligations to render party services, were largely taken from among school-teachers, county or town clerks, assessors, or other persons having familiarity with figures and facility in writing. All these appointments were subject to the negative of the Census Office, which fact alone was sufficient to prevent any considerable proportion of bad selections, inasmuch as the disappointed could at once enter protest at Washington; while, from the moment each enumerator began his work until the evening he closed it, he was bound to render a daily report to the Census Office on postal cards specially prepared for the purpose.

Most important of all, however, was the better supervision of the smaller enumeration districts of 1880. By the former law, districts might embrace as many as 20,000 inhabitants, not only causing the enumeration to be protracted over a long time, but requiring the enumerator to canvass an extensive district, and, by consequence, to work much of his term in country with which he was acquainted only in a very general way, or, more probably, not at all.

By the Act of 1879 districts were not to exceed 4000 inhabitants, and the Census Office was entrusted with the control of the formation of districts equally with the appointment of enumerators. As against the 6400 Assistant Marshals of 1870, 31,500 enumerators, each within a clearly defined district, were set to work on the 1st of June, 1880. In other words, after allowing for the extension of the settled area during the preceding decade, the average size of an enumeration district in 1880 was only about one-fourth that of an enumeration district of 1870; so that the agent of the government was kept at work always much nearer his home, upon ground he was familiar with, and among people many of whom he personally knew.

A score of minor points might be made in this comparison of the Act of 1879 with that of 1850, as establishing the agencies for the enumeration of the population, but the foregoing will suffice to show how it came about that, with a

better state of public feeling at the South, with an increased interest in the results of the census, and with improved machinery of enumeration, from the central office out to the remotest district of the land, the count of 1880 was at once so much more sweeping and so much more searching than that of 1870.

That the white population shared in some degree in the omissions resulting from the defective methods and negligent service of 1870 is beyond question; but it is only the probable loss among the colored which I shall consider in the remainder of this paper.

For the purposes of this inquiry let us bring together into one table the figures which we have given in connection with successive censuses. The table will then be constructed as follows:—

	Colored Population.	Per Cent of Total Population.	Increase, Per Cent.		
			10 Years.	20 Years.	30 Years.
1790	757,208	19.3	....	....	...
1800	1,002,037	18.9	32.33	....	....
1810	1,377,808	19.0	37.50	51.96	....
1820	1,771,656	18.4	28.50	76.80	133.97
1830	2,328,642	18.1	31.44	69.01	132.39
1840	2,873,646	16.8	23.40	62.30	108.57
1850	3,638,908	15.7	26.63	56.26	105.39
1860	4,441,830	14.1	22.07	54.57	90.74
1870	4,880,009	12.7	9.86	34.11	69.82
1880	6,580,793	13.1	34.85	48.15	80.85

It is by reference to the columns which present the increase, per cent, in the colored population by 20 years' and by 30 years' periods, that we find the clearest indication regarding the probable numbers of this element of the population in 1870.

It will be noted that there had been a continuous decline, though not at a uniform rate, in the per cent of increase by 20 and by 30 years' periods from the beginning. This movement was apparently still in progress when the war occurred

in 1861. Nothing is known to have occurred between 1860 and 1870 which was of a nature to reverse the previous course of decline in this element. On the contrary, while the public mind, in anticipation of the Census of 1870, exaggerated the exceptional losses of the decade among the colored population, those losses must have been severe and extensive. Although on the old plantations something like the habitual rate of increase may have been maintained, there is an overwhelming concurrence of testimony that in camps and cities the mortality of the colored people had been excessive. We conclude, therefore, that it would be in the highest degree irrational to assume that the rate of increase among the colored population during the 20 years' period was greater than during the corresponding period ending in 1860.

1. Let us see what would have been their actual numbers in 1870, provided the rate of increase in the 20 years' period ending in 1870 had been found to be precisely the same as in the corresponding period ending in 1860, viz., 54.57 per cent. In this case we should have a colored population of 5,624,505; and our table for the later decades would have to be reconstructed as follows:—

	Colored Population.	Per Cent of Total Population.*	Increase, Per Cent.		
			10 Years.	20 Years.	30 Years.
1860	4,441,830	14.1	22.07	54.57	90.74
1870	5,624,505	14.3	26.63	54.57	95.72
1880	6,580,793	13.1	17.60	45.15	80.36

*In constructing this and the following tables, the total population for 1870 has, of course, been increased by the same amount as the colored population.

Here we see that, on such an assumption, the colored in 1870 contributed a larger proportion of the population than in 1860. Again, this would make the rate of increase for those ten years 26.63 per cent, although it had been only 22.07 per cent during the ten years preceding, and sank to

17 per cent in the ten years following. Again, this would make the rate of increase in thirty years 95.72 per cent, although it had only been 90.74 per cent in the 30 years ending 1860; and was found to be only 80.85 per cent for the 30 years' period, 1850-80. Do we need to accumulate more improbabilities as against this assumed ratio?

2. Let us inquire what would have been the actual number of the colored in 1870, provided the rate of increase had been the same for the 30 years ending 1870 as for the corresponding period ending 1860, viz., 90.74 per cent. In this case there would have been a colored population of 5,489,196; and our table would have to be reconstructed for the later decades as follows:—

	Colored Population.	Per Cent of Total Population.	Increase, Per Cent.		
			10 Years.	20 Years.	30 Years.
1860	4,441,830	14.1	22.07	54.57	90.74
1870	5,489,196	18.9	23.29	50.50	90.74
1880	6,580,793	18.1	20.06	48.15	80.85

Here we, indeed, find the share of the colored in the total population to be between that of 1860 and that of 1880, and the rate for the 20 years' period ending 1870 falls between that for 1860 and that for 1880 (1860, 54.57; 1870, 50.50; 1880, 48.15); but the gain per cent between 1860 and 1870 is made to be greater than that between 1870 and 1880 in the proportion of 23.89 to 20.06, while remaining even greater than for the preceding period. Now, if it be true that the influence of the war and of sudden and violent emancipation, often followed by wide dispersion, was in some considerable degree, higher or lower, unfavorable to the increase of the colored population between 1860 and 1870; and if no compensating cause can be adduced (and I do not know that any has been suggested), then such a ratio for the 20 years' period ending 1870 cannot reasonably be assumed.

3. We have said that it would be in a high degree irrational

to assume that the ratios for the several periods ending in 1870 could have been greater than for the corresponding periods ending in 1880; and we have seen what would be the effect of assuming these ratios to be actually the same. Let us now see what would have been the colored population of 1870, and what its relations to the white population, etc., had the ratios prevailing for the several periods ending in 1870 been the same as those for the corresponding periods ending in 1880. And, first, let it be supposed that the ratio for the 20 years ending in 1870 was that which prevailed for the 20 years ending 1880, viz., 48.15. Applying this ratio of increase to the colored of 1860, we should have for 1870 a colored population of 5,390,894; and our table would be reconstructed as follows:—

	Colored Population.	Per Cent of Total Population.	Increase, Per Cent.		
			10 Years.	20 Years.	30 Years.
1860	4,441,830	14.1	22.07	54.57	90.74
1870	5,390,894	13.8	21.37	48.15	87.59
1880	6,580,793	13.1	22.07	48.15	80.85

Here the figures for 1870 are in each case, except in respect to the one assumed common ratio, found between those for 1860 and those for 1880. The total colored population is, in round numbers, 950,000 above that of 1860, and 1,200,000 below that of 1880. The proportion of the colored to the total population, which was 14.1 in 1860, sinks to 13.8 in 1870, to fall further to 13.1 in 1880.

4. So far the process of the figures for 1860 to 1880 is in the direction indicated by the table generally. Let us, however, try to secure a result which shall be even more clearly self-consistent. We will assume that the ratio of increase for the 30 years' period ending in 1870 was the same with that for the corresponding term ending in 1860; and then see how our table will be constituted on this assumption.

	Colored Population.	Per Cent of Total Population.	Increase, Per Cent.		
			10 Years.	20 Years.	30 Years.
1860	4,441,830	14.1	22.07	54.57	90.74
1870	5,206,992	13.4	17.22	43.09	80.85
1880	6,580,793	13.1	23.38	48.15	80.85

I confess that the figures given above seem to me to represent not unfairly the probable colored population of 1870 and its relations to the general population and to its own past. Somewhat between three and four hundred thousand I believe to have been the loss by defective enumeration. The fall in the ratios of increase during the several periods from 22.07 for 10 years to 17.22; from 54.57 for 20 years to 43.09; from 90.74 for 30 years to 80.85 is to be attributed to the social confusion and the enhanced mortality of four years of war between 1861 and 1865, partially recovered from during the five years of peace, indeed, but still of social and political turmoil, immediately following.

HOW TO MAKE STATISTICS POPULAR.

BY CHARLES F. PIDGIN.

READ BEFORE THE ASSOCIATION OCT. 30, 1890.

I have been requested by your Secretary to present a paper upon the subject "How to Make Statistics Popular." The time allotted me, twenty minutes, will not allow of an extended opportunity for consideration or illustration, but I shall be able to present briefly a survey of the wide field to be covered, to consider the agencies now engaged in the work, to examine the results of their labors, and to make some suggestions in regard to the establishment of new agencies for propagandism, and concerning new methods of work.

My first experience in statistical work was in 1873, when I became connected with the Bureau of Statistics of Labor, my service with which will form a consecutive period of eighteen years in June next. I well remember a quotation from a letter from a distinguished statistician of the United States which appeared in the report for 1874. The words were: "The country is hungry for information; everything of a statistical character, or even of a statistical appearance, is taken up with an eagerness that is almost pathetic."

At that time the results of the Ninth United States Census were being given to the public. The Massachusetts Bureau of Statistics of Labor had been established for four years, but its labors had been declarative and argumentative rather than statistical.

The demand of the people to know themselves was answered by the action of the people's servants,—the legislators. Bureaus of labor, agriculture, industries, mines, etc., were organized in the different states. The new states of North Dakota and South Dakota established such bureaus

by constitutional provisions, instead of by statute as in the older states. Today we have twenty-three state bureaus and the National Department of Labor. To these must be added the Bureau of Statistics of the Treasury Department at Washington, which supplies us with statistics of imports, exports, and immigration. The Bureau of Statistics of the State Department furnishes reports from the Consular Agents of the United States. These statistics relate, principally, to wages, prices, and markets. A few of the states issue registration reports,—or statistics of births, marriages, divorces, and deaths. The foreign governments are prolific in such statistics, technically called “movement of the population.” Massachusetts has forty-two reports in its Public Document series, and those relating to education, insurance, savings banks, prisons, health, lunacy, charity, railroads, labor, and manufactures are largely statistical. On the quinquennial and decennial periods come the State and National censuses. The foreign governments supply statistics on nearly every subject, statistics of manufacturing industries, on the Massachusetts plan, being the most notable omission. The National Government issues a series of departmental and bureau reports which appreciably swell the aggregate of annual statistical material. To this mass of material we might add the reports of Boards, Associations, Societies, etc., which add yearly to our statistical accumulations.

Judging from this statement of the growth of statistical offices and the conditions of plenty as regards statistical material, one might be led to say that statistics were assuredly popular at the present day. But are they? Are not statistics usually called “dry”? Do not writers as a rule omit them from their articles, and do not orators eschew them except during the excitement of a congressional election? In the old days, I mean when I first became interested in politics, we had “roorbacks,” or campaign stories. The politicians understood them, but the people did not, and they had some effect. These were literary “roorbacks,” or juggling with

words. Now we have statistical "roorbacks," or juggling with figures, and neither the politicians nor the people understand them.

I have summarized our sources of statistical material. What are our agencies for statistical assimilation? How shall this material be put into shape for the popular mind? The average citizen is too busy a man to examine all these publications for himself; and as the editions are not large enough to supply every citizen with a copy, manifestly a large proportion of the community must obtain its statistics from the newspapers, from periodicals, or from works devoted to special subjects which present the contents of many volumes in a condensed form in one pamphlet or book.

The printing press is the most potent aid that the statistician possesses. As I have remarked, few at the present day care to listen to an address or lecture full of statistics. They may appeal to the eye, but rarely attract the ear. This suggests a potent method of reaching the public ear with statistics. Bring them into text form,—change the perpendicular columns of figures into horizontal lines of words, and instead of comparing one long number with another number, perhaps even longer, bring everything to the basis of percentages. If I say that out of 46,918,206 persons in the German Empire 28,459,108 have blue eyes and flaxen hair, I leave upon my audience no impression that they can carry away with them; but if I say that 50 per cent, or one-half, of the inhabitants of the German Empire have blue eyes and flaxen hair, I have supplied them with a statistical point that should linger in their minds.

So, in the published report itself, it may be allowable to draw conclusions, to make deductions, but they should be put in clean-cut paragraphs or, better still, short sentences, so that the busy man may read and remember.

The newspaper can be of incalculable service in disseminating statistical information. It speaks often to large audiences; it adds to the fame of the statistician and to the

education of its readers by publishing the results of statistical investigations. The newspaper editor is a busy man. Perhaps he has both the ability and the inclination to take a large volume of statistics and boil it down for his readers, and perhaps he has not. In either case it may be that he cannot spare the time; the book is put to one side; and when the time is found the statistics are "old,"—that is, they have been discussed by other papers, and it is too late to write a review.

This state of affairs can be largely remedied if *what a statistical volume means* is brought into a few compact paragraphs by the statistician himself and made so conspicuous by kind of type or prominent position that the busy editor sees it and transfers it to the columns of his paper.

The preparation of abstracts by the statistician may seem to have a "cut and dried" appearance; but it must be remembered that this abstract is always given as an item of news, and not as an editorial utterance,—that is, the newspaper does not necessarily endorse the conclusions contained in the abstract.

Something is being done to popularize statistics. In the first place, I am glad to note that the Census Office gives percentages of increase or decrease with its population figures. This plan will undoubtedly be followed in the various bulletins to be issued. In addition, the Superintendent of the Census has appointed a Special Agent for Abstracts and Items. It will be his duty to supply old channels, and to discover new channels into which statistics can be advantageously sent. He will have a classified list of every newspaper and periodical in the country. He will also have a list of the writers and speakers who use statistical material in their articles or addresses. Not only will he supply to newspapers, writers, and speakers the information contained in Census Bulletins and Reports, written in popular form in abstracts and in items of various lengths, but he will also endeavor to learn what special statistics or new combinations

of results are desired: and, if possible, such statistics will be prepared and sent to the parties desiring them. These abstracts and items will be printed on one side of the paper only, so as to be immediately available as copy, and between the items white spaces will be left, so that the party using them can cut them out and make them part of his article or speech. Each Special Agent of the Census deals with his own specialty, and each Bulletin and published Report will have the distinctive treatment of the department from which it comes. It will be the duty of the Special Agent for Abstracts and Items to correlate this material, that is, to write abstracts and items containing results drawn from various Bulletins or Reports, and brought together in such a way as to show correlated results that the individual handling of Bulletins and Reports would not supply. These abstracts and items, honestly and scientifically prepared, and supplied free of expense to all who may desire them, together with their appearance in the entire press of the country, will have a potent influence in educating the people to read and remember statistical results; and that is what I mean by "making statistics popular."

With its Report for 1889, upon being authorized by the Legislature, the Massachusetts Bureau of Statistics of Labor introduced a new plan of issuing its annual reports. Being composed of Parts, each distinct in itself, these Parts are issued as soon as ready in pamphlet form. A double purpose is secured by this method of publication. The statistics reach the public earlier, for Part I is not held back several months until the entire Report is ready. Again, the newspapers give as much space to the consideration of one of these Parts as they formerly did to the entire Report. This means a gain to the Bureau, the newspapers, and the public. It would seem that this plan could be advantageously followed in the publication of census volumes. Then each subject could be issued in pamphlet form as soon as ready without waiting a year or more for the complete volume. This plan

would also do away with the too often cumbersome general analyses, for each part or section would necessarily be accompanied by its special analysis.

The Massachusetts Bureau of Statistics of Labor will present three statistical novelties in its Reports for 1890 and 1891. The first one will be a "Labor Chronology." We read in the papers from day to day of strikes in Massachusetts, in other states of the Union, and in foreign countries. We read also of movements in the many phases of the labor question, — co-operation, building associations, new trades unions, labor legislation, the starting of new industries or the marked development of old ones, the deaths of prominent labor reformers, the Janus-like effects of the tariff, — in fact, the daily record of industrial progress, decline, or conflict. The "Labor Chronology," as its name indicates, will supply a condensed history of all such points for the year 1890, and succeeding years. Not only will the arrangement be chronological, but it will be arranged also by subjects, so that the editor, politician, writer, or workingman can consult this chronology and find the year's history as regards strikes, co-operation, industrial partnership, growth of manufactures, labor legislation, or any other labor subject in which he may have a particular interest.

In the summary made of the twenty annual reports of the Massachusetts Bureau of Statistics of Labor it was shown that more space was devoted to the subject of wages, prices, and cost of living than to any other. The Wage Statistics comprehended from 1752 to 1883, or 131 years. In the Report for 1891 the statistics of wages and prices will be brought up to 1885. To enable comparisons with Massachusetts figures to be made, the Bureau will tabulate the entire returns contained in Volume XX of the United States Census of 1880, or nearly 700 quarto pages of statistics of wages and prices from 1830 to 1880. In addition, the wage returns and the statistics of prices of the necessities of life found in the Bureau reports of the various states from their organization

to 1885 will be brought into line, as will also similar figures for Great Britain, Germany, France, Russia, and other European countries. The object in view is to bring the history of wages and prices forward to the latest possible date. The original transcripts will require fully 500,000 separate slips; and these must be sorted so as to bring out the details of each branch of occupation, sex, year, state or county, age, whether day or piece work, and the actual or average weekly wages; with regard to prices, the particular article, year, state or county, city or town (with population), and the price per established unit of weight or measurement. These half million slips will be speedily and accurately handled by machinery, and the results classified, as regards both wages and prices, as high, medium-high, medium, medium low, or low. We can then see, at a glance, the relation of wages to prices, in the countries considered, for specified years.

The third departure from routine work will be the publication of a Statistical Abstract of Massachusetts Public Documents. The public document series now numbers forty-two publications, although all do not contain statistics. Such as do, however, will have their salient points compressed into a page or less, so that the mechanic, mill operative, or manufacturer can glean from a pamphlet of thirty pages the statistical essence of thousands of pages.

It is with no desire to interfere with the work of any other department that this condensation is undertaken. Its sole purpose is to make statistics popular by making them easily attainable, to express great facts in short sentences, so that the active pushing American can read as he runs and remember what he reads.

But more should be done. Permanent provisions should be made for the annual publication of the Statistical Abstract of the United States now issued by the Bureau of Statistics of the Treasury Department. Chief Brock has submitted to Congress the draft of a bill which provides that the various departments of the government shall supply the statistics

required for the Abstract. Even if this Abstract is provided for, but half is done that is required. The material must be still further condensed and sent broadcast over the country in the form of short abstracts in text form, and in the form of items so arranged as to be available for copy by simply cutting from the sheet, which should be printed on one side only.

There should also be a Central Statistical Bureau of the United States, to collect and assimilate the work of American and foreign statistical offices and bring their work into shape for comparison. As such an office would not undertake original investigations, but would deal with official reports, or with material collected by other parties, it would not be necessary that such an office should be conducted by the government. It would be much better to have it organized on a private commercial basis.

Such an office would supply its authorities with all its tabulations and presentations. It would be an office free from partisanship, for its proprietors would conduct it on a professional and financial basis. As long as it maintained this independent position its statistical value would be acknowledged.

Such a Bureau, from its vast collection of official and personal statistics, could prepare abstracts and items for the use of newspapers. It could prepare special statistics for editors, writers, merchants, statesmen, and others. It could publish small pamphlets on live subjects, giving in condensed form, at a small price, the results of original investigations from the published reports of statistical offices in all parts of the world. Its translators would put into graphic English, within a few days after their receipt in this country, the reports of foreign statistical offices, and the latest productions of individual foreign statisticians. Such a Bureau would naturally publish a statistical paper,—probably a weekly. It would contain original articles, biographies of leading statisticians with portraits, accounts of the principal

statistical offices in the world, personal items, reviews of statistical works, a record of the progress made in practical statistics; in fact, be "a trade paper," and a means of communication for those connected with or interested in the science.

To the American Statistical Association and to the Annual Convention of Chiefs and Commissioners of Labor Bureaus the people of America must look for the organization, or, at least, the generous encouragement, of all legitimate plans for making statistics popular, that is, for having statistical truths form part of the education of the progressive American.

The newspaper editor, the statistician, the special agent for abstracts and items, the statistical weekly, monthly, or quarterly, the Central Statistical Bureau,—in fact, all dispensers of statistics,—must supply them in such form that they will catch the eye, appeal to the mind, and linger in the memory. This, in my opinion, is the true answer to the inquiry—"How can Statistics be made Popular?"

THE STUDY OF RETAIL PRICES IN BOSTON AND VICINITY.

By WALTER F. COOK, S.B.

At the suggestion of Dr. Davis R. Dewey, Associate Professor of Economics, I undertook in the spring of 1890, as a basis for a thesis to be submitted for graduation at the Massachusetts Institute of Technology, an investigation of the variation of retail prices in Boston and its immediate suburbs.

For this purpose the following localities were chosen: the North End, the West End, East Boston, South Boston, Roxbury, the South End, Dorchester, the Back Bay, Brookline, and the central portion of Boston proper. In each district I endeavored to select those stores whose trade appeared to be typical for that section; and as nearly as possible I compared the prices of the same brand of goods. As far as possible also only such goods were selected as may be considered staples in their respective lines,—that is, not goods of one season only, but those kept in stock by ordinary dealers at all times. Goods which were likely to vary in price from day to day were avoided. The prices of the goods of one line were collected before those of another were begun, excepting where two lines of goods were kept in the same place, as in the case of groceries and provisions. The time occupied in collection was about three weeks in each line. The articles selected for consideration are divided into five classes: I, Groceries; II, Provisions; III, Dry Goods; IV, Drugs; V, Coal. A reference to the accompanying tables will show the names of the particular articles. In collecting the data a personal visit was made to the different dealers. Except where standard brands were priced, the goods were seen if possible. Some difficulty was encountered in getting these prices until the dealers were thoroughly satisfied that the information was not desired in the interest of some rival house, and in most instances the request was granted. In some places complete lists could not be obtained. Of course it is not to be inferred from the figures here presented that prices throughout a district necessarily conform in all cases to those quoted; these are only offered as prices of what may be termed the average establishments of the several districts.

Prices were obtained from eighteen grocery stores, sixteen provision stores, sixteen drug stores, thirteen dry goods stores, and twelve coal dealers. The grocery, provision, and drug stores exhibited the greatest variations, especially the latter; dry goods and coal prices were more uniform. Among the groceries Mocha coffee varied from 32 to 40 cents a pound; sugar showed the least variation of any article, for at fourteen places out of eighteen its cost was seven cents a pound, and at the other four seven and one-half cents. In the grocery and provision business the quality of the goods kept was more dependent upon the class of trade than it was in the three other trades studied. The prices obtained from the druggists showed the most extreme variations. Only two articles of those selected were found with the same price in all of the stores,—pressed herbs per pound, and black licorice per stick. Upon a patent medicine the extremes were 34 and 50 cents for exactly the same article. For a certain prescription the highest price was 50 cents and the lowest 25 cents, a difference of 100 per cent. With ammonia a difference of more than 800 per cent was found.

In the dry-goods trade no one district appears to possess any decided advantage over another in the prices of the articles selected, save in cambric and ticking. In groceries and provisions, however, no such general statement can be made. Coal per ton does not vary in price, but in small quantities the price is largely subject to agreements between the dealer and purchaser. The results of the inquiry are appended in the following tables:—

GROCERIES.	North End.	West End.	E. Boston.		S. Boston.		Roxbury.		Brookline.		Beak Bay.		Boston.	
Flour.....	\$.35	.70-.90	\$.30	\$.35	.35	.35	.30	.35	.35	.35	.30	.30	\$....	\$.35
Sugar.....	.04	.05	.05	.05	.05	.04	.04	.04	.05	.04	.04	.04	....	.05
"	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07
Rice.....	.07-.09	.03-.08	.05-.08	.07-.09	.08	.06	.08-.10	.08-.10	.07-.09	.07-.09	.10	.09	.09	.08-.08
Tea, Oolong.....	.25-.70	.40-.75	.40-.70	.25-.75	.50-.75	.50	.30-.60	.70	.25-.75	.35-.70	.50-.81	....	.40-1.50	.50-.75
"	.35	.35	.35	.40	.38	.40	.35	.40	.32	.38	.38	.37	.37	.35
Coffee, Mocha.....	.08	.08-.10	.10	.08	.08	.09	.08-.10	.12	.08	.09	.10	.10	.10	.10
Beans.....	.45	.50-.60	.50-.60	.40	.35-.70	.50	.45	.50	.55	.45-.60	.60	.60	.60	.45-.60
Molasses.....	.08	.08	.08	.10	.08-.08	.04	.08	.07	.08	.05	.08	.10	.09	.08-.10
Starch.....	.07	.07-.09	....	.10	.08	.10	.10	.08	.07-.08	.10	.10	....	.08-.09	.08-.10
Codfish, dry.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
COAL.														
One-half Bushel, 50 lbs.....	.25	.25	....	....	....	.20	....	....	....	....	....	....	....	.20
One Ton.....	5.75	....	5.75	5.75	....	5.75	....	5.75	....	....	....	....	....	....
One-half Ton.....	2.90	....	3.00	3.00	....	3.00	....	3.00	....	....	....	....	....	....
One-quarter Ton.....	1.45	....	1.55	1.55	....	1.55	....	1.55	....	....	....	....	....	....
100 Pounds.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
PROVISIONS.														
Beef, Sirloin.....	.25	.25	.25	.25	.25	.25	.25	.25	.22	.28	....	....	.25	.25
" Ramp.....	.25	.25	.25	.25	.25	.25	.25	.25	.25	.28	.25	.25	.25	.23
" Corned, Brisket.....	.10	.10	.10	.10	.10	.10	.10	.12	.11	.14	.12	.09	.09	.10
" " Flank.....	.05	.05	.05	.05	.05	.04	.05	.05	.08	.10	.10	.09	.08	.04-.05
Sheep Stock.....	.03	.04-.05	.04-.06	.05	.03	.03	.02	.03	....	....	.05	....	.03	.03
Mutton Chops.....	.16	.20	.25	.20	.14	.15	.20	.25	.22	....	.25	.25	.15	....
" Leg.....	.12	.16	.15	.14	.14	.14	.18	.13	.17	....	.20	.18	.14	.10
Veal, Leg.....	.12	.15	.14	.15	.14	.14	.18	.16	....	....	.25	....	.14	.08-.13
Sausages.....	.10	.12	.12	.16	.14	.12	.10	.12	....	....	.12	....	.10	.10
Pork Chops.....	.10	.12	.12	.12	.10	.10	.10	.12	.11	....	.12	.10	.10	.14
Chicken.....	.18	.20	.18	.20	.18	.20	.18	.20	.33	....	.30	.15	.20	.20
Fowl.....	.15	.16	.17-.18	.20	.16	.16	.16	.18	.20	....	.20	....	.14	.10

DRUGS.	North End.		West End.		E. Boston.		S. Boston.		Roxbury.		Back Bay.		South End.		Dorchester.		Brookline.		Boston.	
	\$.	¢.	\$.	¢.	\$.	¢.	\$.	¢.	\$.	¢.	\$.	¢.	\$.	¢.	\$.	¢.	\$.	¢.	\$.	¢.
Aloes.....	Oz.	.05	.10	.10	.05	.05	.10	.05	.15	.15	.15	.15	.15	.15	.10	.25	.05	.35	.05	.15
Ammonia.....	Pt.	.25	.50	.25	.25	.20	.25	.15	.40	.40	.20	.40	.30	.30	.40	.40	.35	.15	.35	.15
Alcohol.....	Pt.	.60	.50	.40	.40	.40	.50	.50	.40	.40	.40	.40	.50	.50	.40	.40	.40	.35	.58	.35
Camphor.....	{ Lb.	.05	.05	.05	.05	.05	.05	.05	.10	.10	.05	.05	.15	.15	.05	.05	.05	.05	.05	.05
Epsom Salts.....	Lb.	.20	.15	.15	.10	.10	.10	.25	.15	.25	.15	.25	.10	.10	.08	.05	.05	.10	.10	.10
Flax-seed Meal.....	Lb.	.10	.10	.15	.10	.10	.15	.15	.15	.15	.15	.15	.15	.15	.18	.15	.15	.10	.10	.10
Hops, pressed.....	Oz.	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
Hornford's Acid Phos.	Stick.	.40	.50	.40	.35	.35	.50	.45	.40	.50	.40	.45	.50	.50	.50	.50	.50	.34	.34	.34
Licorice, black.....	Stick.	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
Quinine Pills, 2 gr.....	Dos.	.20	.15	.15	.15	.15	.20	.15	.15	.30	.15	.15	.15	.15	.25	.25	.15	.12	.12	.12
Sulphur.....	Lb.	.10	.05	.15	.15	.15	.10	.25	.15	.15	.15	.20	.25	.25	.08	.08	.15	.10	.10	.10
Prescription.....		.35	.30	....	.45	.25	.50	.25	.50	.35	.45	.35	.50	.50	.40	.40	.40	....	....	....

DRY GOODS.	North End.		West End.		E. Boston.		S. Boston.		Roxbury.		Dorchester.		Boston.		South End.	
	Yd.	¢.	Yd.	¢.	Yd.	¢.	Yd.	¢.	Yd.	¢.	Yd.	¢.	Yd.	¢.	Yd.	¢.
Cotton, unbleached.....		.10	.08	.08	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
" bleached.....		.10	.08	.09	.10	.09	.09	.10	.09	.10	.09	.10	.09	.10	.09	.10
" crash.....		.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
Cambric.....		.07	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
Oil Cloth, table.....		.25	.20	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
Shirting, prints.....		.06	.07	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
Silica.....		.12	.12	.12	.12	.12	.12	.12	.12	.12	.12	.12	.12	.12	.12	.12
Ticking, A. C. A.....		.18	.16	.15	.15	.15	.16	.18	.18	.20	.16	.18	.17	.15	.15	.15
Whalebones.....	Lb.	.15	....	.12	.15	.13	.13	.13	.13	.17	.12	.15	.13	.14	.13	.13
Spool Thread, cotton.....		.05	.05	.05	.05	.05	.05	.05	.05	.04	.05	.05	.04	.04	.05	.05
" " silk.....		.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10

REVIEWS AND NOTICES.

LABOR STATISTICS.

Twentieth Annual Report of the Massachusetts Bureau of Statistics of Labor. Horace G. Wadlin, Chief. December, 1889. Boston. Pp. xxv, 694.

A large portion of this Report is taken up with the presentation of the Statistics of Wages. This subject has proved a very attractive one to the state Bureaus, as it has to popular writers, but, as has frequently been pointed out, most if not all former reports have occupied their space with deceitful averages.

Scientific statisticians have often proven that "the general average wage" means absolutely nothing, and the Massachusetts Bureau has done more than any other to correct the fallacies that have arisen.

Part V of the present Report is a suggestion and praiseworthy effort to give truly valuable tables. After criticising the inaccuracy of the general average rate of wages, the compiler presents a series of tables showing for each group of industries the number of persons, male and female, receiving less than \$5 per week, between \$5 and 6, 6 and 7, 7 and 8, 8 and 9, 9 and 10, 10 and 12, 12 and 15, 15 and 20, and over \$20. This is what has been called the classified wages method. The figures are old, being those of the Census of 1885, but the new presentation is very valuable. It would have added to the value of the columns headed "Male" and "Female" if they had been subdivided into "children" and "grown persons"; but this would have greatly increased the work, and some serious difficulties would have been encountered. Great credit is due to the Bureau for what it has done, and for the example it has set. It is understood that Col. Wright, whose advice was sought in this matter, is carrying on a similar investigation in the National Bureau at Washington, and it is to be hoped that others will soon follow and adopt the plan.

Part I, The Relation of Wages to the cost of Production, is also important. It is one of the first presentations of valuable figures on this interesting question, and a method which appears to be reliable has been adopted.

One thousand six hundred and fifteen different manufacturing establishments have been drawn upon to furnish the material, and these were so chosen as to represent all the classified industries of the Commonwealth. In these specified instances the question is asked and answered, What relation does the cost of labor bear to the cost of the product as it lies completed in the manufacturer's hands? The answers give three facts, the percentage of the total cost of production paid (1) in wages, (2) for raw material, and (3) for expenses not specified. These are again divided so as to give figures for a certain specified quantity of the article produced, and also for the whole establishment. The whole is neatly tabulated and given in full.

Tables are given which very well establish the claim of representativeness, and especially is it creditable that the larger and more important industries are the ones most fully reported.

The present results of the investigation are reached in the following conclusions, which are clearly stated and well represented in a table.

Classification of Wage Cost.	Range.		Product.		Persons Employed.		
	Highest.	Lowest.	Value.	Percentage Represent'd.	Males.	Females.	Total.
More than one-half	77.06	51.24	\$15,991,687	2.37	14,819	1,576	16,395
Less than one-fifth	18.34	5.92	158,016,950	23.42	29,441	7,864	37,305
Between one-third and one-half.....	49.82	33.76	163,817,382	24.28	96,631	7,414	106,045
Between one-fifth and one-third ...	33.33	20.60	313,010,086	46.40	112,297	95,508	207,805
Totals.....	77.06	5.92	\$650,836,105	96.47	255,188	112,362	267,550

1. In industries, in which the total value of goods made, as shown in the last decennial census, was \$15,991.687, or 2.37 per cent of the aggregate value of goods made in the manufacturing and mechanical industries of the Commonwealth, the wage cost does not fall below one-half of the total cost of production. These are the industries in which the raw material is a crude substance of relatively low cost, as clay, sand, rough stone, etc., or in which a high degree of skill is required, as in watch-making and the like.

2. In industries, in which the total value of the goods made was \$158,016,950, or 23.42 per cent of the aggregate, the average wage cost does not rise above one-fifth of the total cost of production. These

are industries in which the raw material or stock used is itself a manufactured article involving labor in its production, the value of such labor not appearing directly in the particular industry specified, or they are industries in which only a small amount of labor is involved.

3. In industries in which the value of goods made was \$168,817,882, or 24.28 per cent, the wage cost was between one-third and one-half of the cost of production. "These are chiefly industries in which considerable technical skill is expended upon materials or articles of stock which have been previously subjected to industrial processes."

4. Most of the great factory industries are included in the fourth class, which pays from one-fifth to one-third in wages. This class produces goods to the value of \$313,010,086, or 46.40 per cent of the aggregate, and employs 56.53 per cent of all the laborers in the industries under investigation.

There is nothing very remarkable in these conclusions, and their usefulness to science will be secondary. They are certainly in no degree popular, but this is not a fault.

The question now arises, how accurate are they? This Bureau is exceptionally well fitted by experience and in personnel for the collection of such statistics, but unfortunately it fails to tell us its exact methods, and the claim that the results are "thoroughly reliable" is not explained by particulars which it is highly desirable should be known to the public. The figures were of course obtained from the employers. They could not be found except in the books of the establishment. It is important that we should know what steps were taken to secure exact and truthful returns.

Part II contains statistics of Markets, Transportation, Imports and Exports, and Competition. Here again much space is occupied in showing that the returns are representative, and again the proof is reasonably satisfactory. Unfortunately, the figures are almost worthless. The question asked was "Where are the products of this establishment sold *principally*?" The last word vitiates the whole, for everything depends on what view the manufacturer took of it.

Add to this that the answers do not adhere to the intended division into Local, Home, and Foreign markets, but even split up into all sorts of confusing and illogical divisions, and the value of this portion is practically nullified.

Under the head Imports the answers to the question, "Are sales decreased by the importation of foreign-made goods?" are interesting

from a political standpoint, but their value is extremely doubtful, especially when we consider that they were collected in the face of a bitter political struggle. This hardly seems a proper subject for investigation by a state Bureau.

Part III, The Condition of Employees. This subject has been extensively treated by the Bureau in former years, and only portions of it are here noticed, such as Relief Funds, Libraries, Profit-Sharing, Hired Dwellings, Rent and Board, Dwellings owned by Employees. The information presented is derived from voluntary answers by manufacturers, and should be taken *cum grano salis*. It may, however, be considered fully as trustworthy as the letters of laborers which so largely fill some of the state reports; and, so far as it may be true, it is of greater value in proportion as the employer is more intelligent.

Part IV is especially valuable because Massachusetts is our great manufacturing state, and because this Bureau has made a specialty of Statistics of Manufactures. This Part is divided into three subjects:

- (1) The date of establishment of existing firms and corporations.
- (2) The names of founders of existing establishments and the date of the adoption of the present firm name.
- (3) The growth of manufactures.

The information given here is derived from the replies to one of the questions of the schedule used to secure industrial statistics in 1885. Of the firms existing at that time 18 were established prior to 1700, the earliest date mentioned being 1636. Sixty-one per cent have been established since 1861, and 45 years (1841-85) cover the organization of 81.60 per cent of existing establishments. Of course this takes no account of the firms that have had their existence and gone out of business prior to 1885. This part forms a sort of introduction to the annual *Statistics of Manufactures*, published by the Bureau, and will be of great value in the future.

Part VI, Daily Working Time. In this part it is claimed that the returns are complete, covering all the establishments in each industry in operation at the time of the investigation. The tables are arranged on the classification principle employed in Part V, and are therefore not vitiated by false averages. The average enters slightly into the summaries, but does not seriously detract from their value.

The attempts at graphic representation in these two parts are not very successful.

Part VIII, Women in Industry. The Massachusetts Bureau has investigated many phases of this subject, having something about it in almost every report. Women are here considered, first, as partners and stockholders in manufacturing and mechanical industries, and, second, as employees in gainful pursuits in all branches of industry.

It appears from the tables that of the 28,294 partners engaged in manufacturing in the state, 1760, or 6.22 per cent, are women, and of 42,731 stockholders, 11,572, or 27.08 per cent, are women.

That the number of female employees in gainful pursuits has been increasing very rapidly is perfectly evident, but the rate of increase is not so easily determined. The figures here given only go back to 1865, and the differences in classification and in groupings reduce the possibility of comparison to a minimum.

FRANK S. HATHAWAY.

Columbia College.

THE UNITED STATES CENSUS BULLETINS.

No. 6. August 4, 1890. *Financial Condition of Counties.* By T. Campbell-Copeland. Pp. 26.

This inquiry covers the financial condition of 2,728 counties; of these about one-third, or 944, are free from debt. The gross debt of the rest amounts in 1890 to \$145,693,840. The net debt and annual interest charges for the several groups of states is as follows:—

	Net Debt.	Annual Interest Charges.
New England,	\$4,489,618	\$189,709
Middle,	21,349,438	1,106,128
Southern,	20,538,734	1,408,991
Western,	66,580,677	4,411,553
The Territories,	2,388,192	201,993
	<u>115,344,654</u>	<u>7,318,374</u>

The various financial characteristics of the several groups of states are illustrated by a large number of maps. From the standpoint of clearness it may be questioned whether the symbols chosen are sufficiently simple to be of great advantage in interpreting the data.

No. 7. Aug. 6, 1890. *Indebtedness of States in 1880 and 1890.*
By T. K. Upton. Pp. 4.

This concise summary shows that state debts have decreased as follows : —

	1880.	1890.	Decrease.
Bonded debt,	\$284,908,212	\$194,800,371	\$60,102,840
Floating “	41,514,809	43,596,218	*2,081,908
Total,	\$296,417,521	\$238,396,590	\$58,020,931

* Increase.

Of the \$58,000,000 decrease, \$28,523,165 is to be accounted for by an enforced refunding of the old debt into a new one at a discount varying from 20 to 85 per cent.

No. 8. Aug. 8, 1890. *Production of Slate.* By William C. Day. Pp. 10.

Contains a statement of the production of slate in 1889. It appears that the roofing slate product is nearly double that of 1879. Tables also show the capital invested, and the average number of employees. A directory of firms producing slate is appended.

No. 9. Aug. 20, 1890. *Production of Pig Iron.* By Dr. Wm. M. Sweet. Pp. 8.

This is valuable for the prompt publication of statistics collected for the year ending June 30, 1890. It affords complete data for showing not only the immense development of this industry, but the territorial shifting of the centre towards the south. The comparative table is as follows : —

Districts.	Tons of 2,000 pounds.		
	Year ended May 31, 1870.	Year ended May 31, 1880.	Year ended June 30, 1890.
New England States.....	34,471	30,967	33,781
Middle States.....	1,311,649	2,401,093	5,216,591
Southern States.....	184,540	350,436	1,780,909
Western States.....	522,161	995,335	2,522,351
Far Western States.....	.....	3,200	26,147
Total.....	2,052,821	3,781,021	9,579,779

No. 10. Aug. 22, 1890. *Quicksilver Mines and Reduction Works.*
By T. B. Randall.

This inquiry is one of the new features of the Eleventh Census, as no similar statement was made in the Tenth Census. All of the productive establishments reported upon, both mines and furnaces, are located in California. The world's production for the period 1880-1889 is reported as follows:—

United States,	407,675 flasks.
Almaden, Spain,	585,939 "
Idria, Austria,	133,557 "
Italy,	66,440 "
	<hr/> 1,093,611 "

A table also gives the production of the United States by years since 1850, the total being 1,544,844 flasks, valued at \$69,258,000.

No. 11 August 23, 1890. *Growth of Rapid Travel Facilities from 1880 to 1889, inclusive, in cities having over 50,000 inhabitants.* By Henry C. Adams. Pp. 8.

This is the first time that street railways have been brought within the scope of the census statistics of transportation. Two hundred and eighty-six street railroads are reported with a total length of 3,151 miles. Table I shows in detail the length of line in fifty-six principal cities in each year 1880-1889, with the increase per cent from 1880 to 1889. A classification is also made as to the various kinds of motive power, a summary of which is as follows:—

	Miles.	Per cent.
Animal power,	2351.10	74.62
Electricity,	260.36	8.26
Cable,	255.87	8.12
Steam, elevated,	61.79	1.96
Steam, surface,	221.81	7.04
	<hr/> 3150.93	<hr/> 100.00

The length assigned to each of the five leading cities is as follows: Philadelphia, 263.47; Boston, 200.86; Chicago, 184.78; New York, 177.10; Brooklyn, 164.44. This order is explained by the statement that it is a peculiarity of the Philadelphia roads and to some extent of the Boston roads that the tracks usually occupy different streets in going to and from a terminus instead of being laid upon the same street. The result of this is that roads in the cities named traverse a greater length of street in proportion to track lengths than in New York, Brooklyn, and Chicago. This inquiry has been conducted by Mr. Charles H. Cooley.

No. 12. Oct. 30, 1890. *Population of the United States and Territories: 1890.* By Robert P. Porter. Pp. 8.

The population of the United States is reported at 62,480,540, an increase of 24.57 per cent as compared with 1880. During the previous decade the rate of increase was 30.08 per cent. The bulletin is largely taken up with explaining this diminution. It is now estimated by Mr. Porter that the omissions of 1870 amounted to not less than 1,500,000, and that the population of 1870 was at least 40,000,000, instead of 38,558,371. Arguments are advanced to support this view.

No. 13. Oct. 31, 1890. *Production of Steel.* By Dr. William M. Sweet. Pp. 7.

This report covers the year ended June 30, 1890. The following table shows the production of the various kinds of steel in 1880 and 1890. The increase is 290 per cent.

Kinds of Steel. (Ingots or direct castings.)	Tons of 2,000 pounds.	
	Year ended May 31, 1890.	Year ended June 30, 1890.
Bessemer Steel.....	986,208	3,788,572
Open-hearth Steel.....	84,302	504,351
Crucible Steel.....	76,201	85,536
Clapp-Griffiths Steel.....	.....	83,963
Robert-Bessemer Steel.....	.....	4,504
Total.....	1,146,711	4,408,926

No. 14. Nov. 4, 1890. *Financial Condition of Municipalities.* By T. Campbell-Copeland. Pp. 67.

This bulletin treats of the debt, resources, and annual interest charges of 858 municipalities. Comparative tables are given for 1880 and 1890, as well as a summary table for each year of the decade ending in 1890. The increase of the total debt of these 858 towns and cities since 1880 has been \$50,455,045, the existing debt being \$745,949,786. For this debt towns in Massachusetts, Maryland, New York, and Minnesota are largely responsible. On the other hand, there has been an increase in the sinking funds of \$32,022,449.

No. 15. Nov. 7, 1890. *The Census of Alaska.* By Ivan Petroff. Pp. 6.

It appears that the enumeration of Alaska is nearly completed, but the returns have been received only in part, and indeed some from the interior districts cannot be obtained until next spring. The report describes the journeys which Mr. Petroff made and the difficulties encountered in the investigation. The area of the territory covered is estimated at 570,000 square miles.

STATISTICAL REPORT OF INTERSTATE COMMERCE COMMISSION.

Second Annual Report on the Statistics of Railways in the United States to the Interstate Commerce Commission, for the year ending June 30, 1890. Henry C. Adams, Statistician.

In addition to the detailed tables Prof. Adams discusses two subjects of statistical method as applied to railways. The first concerns the classification of railway statistics. Upon this it is remarked that for correct statistical analysis railroads ought to be classified according to the social and industrial conditions which environ them. In arranging for a classification the following principles should be kept in mind:—

First. Some regard should be had to the nature of competition between railways themselves. There is, perhaps, no better indication of the direction in which competition between railways works than the grouping of railways themselves as seen in the various freight and traffic associations that have come spontaneously into existence. It would, then, seem proper, in adopting a rule of classification, to have some regard to the territories covered by the various railway associations.

Second. It would also be desirable to take into consideration the nature of the service rendered by the railways. Under this head it would be necessary to note the density or sparseness of population in the territory through which the railways run, and the nature of the industries that provide freight to be carried. Thus, there are certain roads that are distinctly mineral-carrying roads; others serve wheat-growing districts, cotton-growing districts, and the like. There are some reasons for classifying railway statistics on lines here suggested.

Third. If necessary, further, to have regard to the operating divisions of the railways themselves; for, if statistics are to be worth anything, they should be actual transcripts from the books of the companies making report, and not estimates on the basis of mileage. In a discussion of the question, this third point should perhaps receive less consideration than either of the others, because it is possible for railway companies to adjust their accounts so as to make actual returns for such territorial divisions as the Commission may decide upon. It is being attempted in the Census Office to make a territorial assignment of statistics of operation for each of the ten years ending 1890. Considerable difficulty has been encountered, but on the whole the undertaking promises well. The work there done will be of great assistance to this Office in determining a proper basis of classification.

Attention is called to the incompleteness of railway statistics. It is stated that there are at least four classes of accounts the analysis of which is not provided for, and which are not included in the books of railway corporations. These are (1) the accounts of construction companies, the neglect of which affect most seriously the question of capitalization; (2) accounts of depot companies and those furnishing terminal facilities, as well as bridge companies; (3) accounts of express companies, which are now not open to inspection, and also of those companies which furnish sleeping cars or other cars performing special services, including the co-operative fast freight lines; and (4) accounts of corporations organized as agents for the soliciting of freight, or for the assignment of freight between competing lines.

There is an impression in the minds of the public that part of the legitimate earnings of railway capital is turned aside from the payment of dividends, and applied to the support of various outside corporations. In this manner, it is argued not only is the demand of the public for cheap service estopped by the quotation of false statistics pertaining to the earnings of railways, but the *bona fide* investor in railway stocks is obliged to take less in dividends than the earnings of the business warrant. This claim is either true or not true; but it is to the interest of the stockholder, as well as to that of the public, that the veil of secrecy be taken from the operations of all secondary corporations engaged in a business directly bearing on the transportation of persons and freight.

It is gratifying to note that the Commission is meeting with some success in securing uniformity of railway returns. The recommendation that the fiscal year should end with June 30 has been respected by changes in New York, Massachusetts, Pennsylvania, Connecticut, New Hampshire, and Florida.

An interesting table among the many presented relates to the distribution of employees of different classes, with calculations as to the number in each class per 100 miles of line. The total number of employees per 100 miles is 459. In England the number is 1748.

BANKS AND BANKING.

Garland's Banks, Bankers, and Banking in Canada, to which has been added statistics of the Dominion. Edited by N. Surrey Garland. Ottawa. Mortimer & Co. 1890. Pp. xxiii, 328.

This is the first edition of a work which it is intended shall be issued annually. In its character it is a statistical annual covering not only the field of banking, but general statistics relating to Canada. Of special value is the synopsis of banking systems of the leading countries of the world, which opens the volume. Other features are quotations of highest and lowest prices of the principle Canadian stocks from 1871 to 1889; deposits in savings institutions annually since 1847; the condition of the debt since 1867, with a valuable column showing the rate of interest paid on the gross debt in each year; details of receipts and expenditures of the Dominion government; condition of loan companies and building societies; commercial and railway statistics, etc. Altogether the volume is a very complete statistical handbook.

Annual Report of the Inspector of Finance, showing the condition of the Savings Bank and Trust Companies in Vermont on June 30, 1890. Pp. 223.

The report shows a continued increase of deposits on the part of a state very largely agricultural in its industry. The deposits in 1890 are \$19,330,564, an increase during the year of \$1,529,236, the largest which has taken place since 1882. The number of depositors is 65,759, of whom 57,918 are residents in the state. Accordingly, about one inhabitant in six throughout the state has a bank account. The inspector discusses in particular the question of investment in western mortgages, the growth of which since 1879 is illustrated by a table. In 1879 such investments were \$1,278,899; in 1890, \$7,519,470. The subject of taxation of deposits is also considered, and it is stated that "the belief that banks are used to some extent as

depositories for avoiding taxation is not well founded." In one town, Rutland, the system of school savings has been introduced, and in a single year 684 accounts have been opened with a total deposit of \$3,529.

How to invest the money deposited is becoming a serious question in Vermont, and recommendations are offered toward a solution. It is advised that savings banks be permitted to invest in railroad securities, which they are now forbidden to do, and that the privilege of investing in municipal bonds of western states be extended to those having a population of 3,000 inhabitants instead of stopping at 5,000, as is now the case.

The Clearing-House System. By Dudley P. Bailey. Reprinted from the *Bankers' Magazine*. Homans Publishing Co. New York. 1890. Pp. 57.

This is an exhaustive statistical survey of the fifty-one clearing-house systems of the United States, with a considerable amount of material relating to other countries. The exhibits are complete not only for the large financial centres, but also for the smaller cities in which clearing houses are established. As far as possible the tables include, from the earliest year of the inauguration of the clearing houses until 1890, the number of banks, clearings, balances, and the percentage of balances to clearings. For foreign countries data are furnished relating to England and her colonies, Paris, Germany, Austria, and Italy.

D. R. D.

THE ENGLISH MINT REPORT.

Twentieth Annual Report of the Deputy Master of the Mint, 1889; with a general index to the annual reports from 1870 to 1889 inclusive. London. 1890. Pp. 136, xi.

The part of most general interest in this report is probably the appendix which deals with the restoration of the gold coinage. This report covers a history of the investigations in regard to light coin in circulation, made by Prof. Jevons in 1868, Mr. John B. Martin in 1882, and more lately in 1888 by the mint authorities. The following table gives the different results mentioned:—

Proportion of Coins per 10,000,000 estimated to have fallen below least current weight by wear.

	Sovereigns.	Half-Sovereigns.
Mr. Jevons' estimate (in 1868).....	3,150,000	4,700,000
Mr. Martin's estimate (in 1882).....	5,470,100	5,392,000
Mint inquiry, 1888 (deduced from mean annual wear)...	5,170,000	7,535,000
Mint inquiry, 1888 (ascertained by individual weighing)	4,597,000	7,044,000
Deduced by calculation.....	5,264,000	7,201,000

The result arrived at by the Mint is a direct one, which does not admit of any error, as each individual coin was passed through one of the automaton balances which separate the coins of legal weight from those which are below it. This last examination justifies the conclusion that the life of a sovereign is somewhat longer and that of a half-sovereign somewhat shorter than Mr. Jevons' figures indicate. On the whole, however, the results of these various inquiries show a remarkable coincidence.

The result of this calculation leads the Mint to estimate that the total value of the deficiency to be made good on the recoinage of light coins is as follows:—

Sovereigns, £120,487

Half-sovereigns, 114,487

It is also reasoned that the total amount of the sovereigns in circulation at the present time is £80,000,000.

This particular inquiry is illustrated by two diagrams which compare the survivals of sovereigns and half-sovereigns as calculated by the three investigations. The general report is also particularly valuable as containing a résumé of the work of the different departments of the Mint in the past twenty years, and also an index of the previous reports. This index alone will be extremely serviceable to all students of monetary questions.

D. R. D.

LOCAL FINANCE AND TAXATION.

In the September-October number of the *Revue d'Economie Politique*, M. A. Achard describes an interesting experiment in municipal administration and finance, undertaken by the city of Geneva. There is a considerable fall in the course of the river Rhone

from Lake Geneva to the confluence of the *Arve*, representing, it is estimated, a motive force of six thousand horse-power; and for many years the municipality of Geneva has supplied water to the city for domestic and industrial purposes, drawing it from the river and distributing it by means of turbines driven by the power of the stream. In 1871 the use of water from the city pipes for motive purposes was permitted, and it was so extensively employed in this way that, three years later, a private company petitioned for the right to utilize the whole power of the river, agreeing to furnish water for the city at its own expense in return for the privilege. The city refused to grant the right, and has since undertaken to collect and distribute the enormous power which had been going to waste within its limits. The plan is to reserve about one-tenth of the power for the domestic water service, and to transmit the other nine-tenths, through a separate system of pipes, by means of water under pressure. The old pipe lines distribute water for the city supply, and for a low-pressure motive power of five atmospheres. The new high pressure system is operated at a pressure of thirteen atmospheres. Eight turbines are now in operation, and it is intended to develop the full power by means of twelve more.

In 1889, 55 different industries made use of this power, by means of 169 motors, representing 550 horse-power. There were 113 motors of an average power of 1.5 horse-power, connected with the old low-pressure system, and 56 motors, averaging 6.8 horse-power driven by the high-pressure service. These motors are used in saw mills, watch factories, and printing offices, but are also employed in driving small machinery, as sewing machines and dentists' drills. The central electric-lighting station is supplied with a force of 629 horse-power in addition. The demand for power is constantly increasing, and during 1890 two new turbines will be put in. The total amount of water distributed in 1889, for domestic, industrial, and motive purposes, for watering streets, and flushing sewers, was 16,400,000 cubic metres, and the receipts from various sources aggregated 569,727 francs. The cost of maintaining this service, including salaries, depreciation, and interest, was 432,594 francs. The city thus obtained a net profit of 137,135 francs.

The low-pressure service is estimated to have cost on the average 2.16 centimes per cubic metre, and the more expensive high service 3.19 centimes per cubic metre. The following table gives the selling

price of water for various uses, and the profit obtained by the city in each case, per cubic metre in centimes : —

	<i>Low-pressure system.</i>		<i>High-pressure system.</i>	
	Selling price.	Profit.	Selling price.	Profit.
Domestic use,	8.71	+6.85	10.48	+7.29
Industrial use,	8.03	+5.87	10.87	+7.68
Motive power,	4.23	+2.07	2.09	—1.10

The city derives a profit from the whole system, but it is apparent that the distribution of motive power is much less profitable than the other services, and in one case is operated at a positive loss. This last is in part due to concessions made to the electric lighting company, which are temporary, and which, when the concessions expire, will make the high pressure service less unprofitable, although it will not change a deficit into a surplus for this service.

According to Beringer, a German specialist, the cost of generating by steam one horse-power per hour is

For an engine of	5 horse-power,	40 centimes.
" " " "	10 "	27 "
" " " "	50-100 "	10.5 "

and for large power, with greatest economy, 5 centimes.

The charges in Geneva are made upon the monthly consumption ; and the tariff for a working year of 3000 hours, for the high pressure system, is

500 francs per horse-power, or 16.67 cent per hour for	1 horse-power.
400 " " " "	13.33 " " " "
268 " " " "	08.93 " " " "
178 " " " "	05.77 " " " "

Although in this case the wear and tear of machinery is not included, as in Beringer's estimate, yet the cheapness of the service is apparent by comparison with his figures. The difference is still more marked if the power be used for twelve or twenty-four hours per day instead of ten, as in the above case ; for then the tariff fixed by the city is but one-seventh or one-half greater as the case may be. Allowance is made by the city for discontinuous service, by the system of charging by the total monthly consumption, and as the cost of such service is made much cheaper than it could be with steam-power where expense is largely continuous, whether service be so or not. The following table shows the comparison of the expense for discontinuous service, that is to say for working years of 1500, 1000, 600, or 300 hours, of water-power and steam : —

	Hours.	1500	1000	600	300
Geneva High Service.	1 horse-power	218 francs	142 francs	85 francs	43 francs
	5 "	1004 "	669 "	425 "	213 "
	10 "	1772 "	1260 "	803 "	425 "
Geneva Low Service.	1 horse-power	378 francs	294 "	176 francs	88 "
	5 "	1575 "	1260 "	756 "	378 "
Steam Power.	1 horse-power	900 francs ¹	600 francs ¹	360 francs ¹	180 francs ¹
	5 "	3000 "	2000 "	1200 "	600 "
	10 "	4050 "	2700 "	1620 "	810 "

¹ These figures are calculated on a basis of 60 centimes as the hourly price. No one horse-power engine has been experimented upon.

From these figures it is plain that the city of Geneva furnishes a motive power to its citizens at a very low price, cheaper by far than steam, especially for small powers and discontinuous service. The motor may be easily set up in dwellings or work-shops. There is no danger from explosion, or fire, and no smoke attendant upon its use.

This distribution of motive power by the city obviously differs in principle from the distribution of water for domestic use, it not being necessary to the well being of its citizens.

The writer sums up the conclusions as follows:—

1. "Although motive power cannot be considered as an object of collective necessity, proceeding that is from the gathering of men into communities, it is not contrary to modern ideas that a municipality should utilize and distribute a natural force, when it can be profitably done only when the force is utilized in its entirety."

2. "The service rendered to the community will be greater in proportion as the method adopted for transmission of the force allows it to be subdivided, and made available in all places."

3. "It is conformable to justice, equality, and the general interest that a municipality which has created an institution of this kind should consider it as a fiscal domain, and should draw from it a profit to be applied to its expense account."

WILLIAM Z. RIPLEY.

Report of the Tax Commissioner of the Commonwealth of Massachusetts for the year ending Dec. 31, 1889. Pub. Doc. 1890. Pp. 299.

This report does not vary in any respect from former annual issues. Among other tables it contains a list of the names of 2,867 corpora-

tions, subject to taxation, with the date of their organization. Of particular value are the tables relating to the finances of the municipalities of the state. In this the tax commissioner presents material somewhat resembling that published by the Local Government Board of England. There is a statement of the assets and liabilities of all the cities and towns, divided according to the usual departments of local administration, as school houses, water works, etc.; also a statement of the valuation and indebtedness of each town with a percentage of the latter to the former, and the amount of the sinking funds.

The following table gives the aggregate valuation and net debt of municipalities for a period of nineteen years:—

Year.	Aggregate Valuation.	Aggregate Net Debt.	Percentage.
1871	\$1,497,351,686	\$39,421,298	.026
1872	1,696,599,969	45,221,745	.026
1873	1,763,429,990	53,380,118	.030
1874	1,831,601,165	64,904,069	.035
1875	1,840,792,728	71,784,006	.038
1876	1,789,359,481	72,165,156	.040
1877	1,669,226,792	73,049,685	.043
1878	1,568,968,210	68,864,685	.043
1879	1,529,521,014	67,728,557	.044
1880	1,584,756,802	68,512,927	.043
1881	1,648,239,976	65,406,691	.039
1882	1,684,213,423	62,782,507	.037
1883	1,731,297,061	63,413,128	.036
1884	1,756,879,778	63,595,568	.036
1885	1,782,349,143	63,306,213	.035
1886	1,847,531,423	68,585,220	.034
1887	1,932,548,607	64,675,061	.033
1888	1,992,804,101	65,586,603	.032
1889	2,072,170,873	66,502,030	.032

It should be added that the net debt of Boston alone in 1889 was \$27,654,190, or about 41 per cent of the total local indebtedness.

Report of the Special Tax Commission of Maine, appointed under resolve of the Legislature, March 8, 1889. Augusta. 1890. Pp. 192.

Without discussing the final conclusions of the Maine Tax Commission in this place, attention is directed to the considerable amount of information and statistical data in regard to the tax systems of various states which is here collected. The Commission studied not only the laws of all the states, but visited New Hampshire, Vermont,

Massachusetts, Rhode Island, Connecticut, and New York for personal inspection of the working of tax laws. Especially full are the facts in regard to the various listing systems, methods of equalization, poll tax, dog tax, taxation of railroads, savings banks, and insurance companies. Students of taxation will find here several convenient summaries upon these points.

Finance Annual Report of the Executive Department of the City of Boston, for the year 1889-90. Boston. 1890. Pp. 416.

In addition to the detailed tables this report contains summaries of Department expenses for the past decade, and in particular valuable statistics and descriptive material on *Valuation and Taxes of Boston compared with other cities*. There is an interesting table showing the approximate value of the dwelling houses, classified according to their respective values, the classes varying by a thousand dollars, up to \$105,000, and more irregularly above that limit. Class three, \$2000 to \$3000, is the largest, containing nearly one-fifth of the total number of houses, etc. This report can be especially commended for the systematic arrangement of its tables, and for the explanatory notes frequently added to facilitate correct analysis.

Report of the Special Committee on use of Streets by Private Corporations. Boston. City Document 144. Sept. 8, 1890. Pp. 35.

This report is out of the common run of city documents, and should be of considerable value to those interested in municipal economy and administration. It contains information in the form of official communications from a large number of cities, both in the United States and in Europe, stating the service or payments which such street-railway, telephone, or electric-light corporations render for privileges enjoyed in the public streets. These reports cover eighteen American and twelve foreign cities. It supplements in some measure a monograph of the American Economic Association (Vol. II, No. 6) on *The Relation of Modern Municipalities to Quasi Public Works*. The fullest report is from Amsterdam. The committee observe that "Boston is in reality very much behind her sister cities in respect to solving the question of securing a return."

NOTE ON THE STATISTICS OF CRIME.

As it may be expected that the results of the Eleventh Census will show a large increase in the amount of crime, the means of studying the facts assume a great deal of importance; it seems proper, therefore, to direct the attention of the Statistical Association to some efforts on foot for obtaining better statistics.

During the last session of Congress a bill was favorably reported by the committee of both Houses for the establishment of a Prison Bureau in connection with the national government. Such a bureau would be similar in its scope to the Bureaus of Labor and Education. One of its chief duties would be the collection of statistics. Its organs would reach into the courts and count the persons accused and convicted of crime, and they would go into the prisons and count the persons serving out their sentences. Its prime object would be the collection of facts. If established, there can be no doubt that we would be able to approach the study of the delinquent classes with greater intelligence and larger prospect of solving at least a few elementary problems. It is to be hoped that the active efforts of Mr. E. C. Foster, general agent of the Department of Justice, the father of the bill, will be successful in securing its passage.

The prison wardens of the United States have an organization of their own for the consideration of practical topics of prison management and for securing uniformity of action along certain lines of policy. The subject of statistics is one of those which they have considered at several meetings. At the request of the secretary of that organization it was the privilege of the writer to present the subject at their recent meeting in Cincinnati in connection with the National Prison Association. A plan of operations was submitted whereby it was believed that accurate statistics of penitentiaries could be collected annually at trifling expense and labor and with excellent results. The plan proposed was that each state institution for adult offenders should fill out blanks for the personal characteristics of each prisoner received during the calendar year, and send these blanks to the secretary of the organization for the compilation of the figures. The results should then be published in a volume to be entitled the "Annual Statistics of Prisoners," the date being given for the various institutions, with the most numerous combinations, and to be accom-

panied by a carefully prepared explanatory text. It might be mentioned that the blanks to be used in this scheme are individual cards, and not lists. It is my pleasure to inform the Statistical Association that the plan there proposed was approved by the organization. Preparations are now being made to carry it into effect. It will be applied to the year 1890, and it is the hope of those who have the matter in charge that the participation in the effort will be general, thus securing from the beginning valuable results.

It is impossible to foretell which of these plans will be most successful. It is important to note that success means opportunities for study which have hitherto been closed to us. The success of either of these plans will be a step towards placing our country on a level with European nations in this respect. Important practical and theoretical problems hinge on the phenomena of crime, and we should have more adequate means of studying them.

ROLAND P. FALKNER.

PRICE STATISTICS.

The latest contribution to the subject of price statistics is an article by Soetbeer in Conrad's *Jahrbücher für Nationalökonomie und Statistik*, Vol. xxi, No. 4, p. 412, entitled: "*Veränderungen im Niveau der allgemeinen Warenpreise im den Jahren 1881-1889.*"

The author first reviews the several attempts which have been made to obtain reliable statistics concerning the fluctuation of prices in the last fifteen years. For this purpose, so-called index-numbers have been used, or percentages of combined averages. Various objections have been raised against this method. It is arbitrary and incomplete, and therefore yields unreliable results. But its chief faults are that the number of articles taken into account is too limited, and that the marked difference in the quantitative economic importance of the goods is either entirely overlooked or reduced to an inappreciable unit.

Most of these deficiencies are avoided by another method to which Soetbeer calls attention, although a considerable margin of errors is still left. It is based on the government valuations of international exchanges, which are observed with increasing interest and exactitude.

The German statistics begin to present appropriate material in 1881, after the statute of July 20, 1879, provided the necessary regulations regarding the declaration of quality and quantity of the goods imported, exported, and transported, and the average prices to be applied in the valuations. This system of the empire differs from that of England and the United States in so far as it does not call for self-declaration of values, but has valuations determined by official experts. The Board of Experts, appointed by the Statistical Bureau, is divided into sections, to each of which certain groups of goods are assigned. In preparing the statistics of last year thirty-nine experts were employed, who estimated the average prices of 933 articles.

They proceed in the following way: Certain groups of products belonging to the same kind are formed. The articles contained in these groups are considered in all their commercial relations, especially in the quantitative relations of the principal qualities in import and export. After having found the average prices of the several articles of which one group is composed, this average price of the group is computed. The import duties and export premiums are not taken into account. The valuations are made for the calendar year. To be of use they must be procured continuously from similar material and according to the same method. They enable us to compare the values of imports and exports for certain periods, but they do not help us in estimating the annual fluctuations in a certain country, since the imports and exports do not equal the production and consumption of such a country.

The fluctuation in prices for the period 1882 to 1889 as compared with the average prices of 1881 is computed as follows:—

	According to Imports.	According to Exports.	Average.
1881	100.0	100.0	100.0
1882	99.8	100.7	100.3
1883	98.2	98.5	98.4
1884	98.3	92.8	93.1
1885	85.8	85.8	85.8
1886	85.4	83.8	84.6
1887	85.5	83.5	84.5
1888	85.4	84.7	85.0
1889	88.6	87.2	87.9

The prices of articles in German foreign trade have thus been decreasing in the years 1883-87, especially so in 1884 and 1885,

although only gradually in 1886 and 1887, while they show a slight increase in 1888 and 1889. But in spite of this increase the average in 1889 is twelve per cent less than that in 1881.

Generally, from such fluctuations the value of money or the purchase power of gold is inferred. Such inferences are correct with regard to the purchase power of gold in wholesale trade, but not to the purchase power of gold in general, since there are other exchanges in which money is used as measure of value and means of payment. From the fact that prices have fallen twenty per cent since 1875, we are not justified in concluding that the means of existence have grown cheaper. On the contrary, the complaints are general that they have become more expensive, and this proves that the value of money has decreased. In retail trade, prices have by no means experienced the same reduction as in wholesale trade, while, on the other hand, higher wages, salaries, fees, are now demanded for all kinds of personal services. The house-rents in large cities are higher, and many other things are more expensive. All this indicates a decrease in the value of money.

Soetbeer, however, does not agree with the bimetallists who maintain that the demoralization of silver has caused the fall in prices. He gives the following comparisons: The level of prices of 1885 and 1888 remained almost stationary, and from 14.2 to 15 per cent below that of 1881 and 1882, while the average price of silver in 1885 and 1888 fell from 48½ to 42½ pence. In 1889 the level of general prices rose about 3.4 per cent above that of 1888, but the average price of silver was lower than in 1888. In consequence of the new silver policy of the United States, the debates preceding it in Congress, and the speculation connected with it, the price of silver rose from 44 pence at the end of 1889 to 54 pence in September, 1890; but it does not seem probable that the prices of merchandise will follow this rise in the price of silver.

L. KATZENSTEIN.

In Weeden's *Economic and Social History of New England* (Boston, 1890), there is an appendix giving a table of prices from 1630 to 1789. The prices for leading staples of domestic production and rates of laborers' wages are stated with great regularity. The list will supplement that given in the *Report of the Massachusetts Bureau of Statistics of Labor* for 1885, the prices in the latter, however, not going back of 1785. For practical use, Mr. Weeden's list needs

explanation. The necessity of an intelligible interpretation of colonial prices is emphasized when a comparison is made between the two lists of prices mentioned above for the period when they overlap, 1758 to 1789. The discrepancies are so wide that a student would have to be very cautious in using either set.

In the *Banker's Magazine*, November, 1890, p. 333, is an article on *Relative Prices of Silver and Wheat*, by H. A. Pierce, in which a statistical table is presented, showing the production and exports of wheat and flour, and the prices of wheat and silver since 1873. The argument from the figures submitted is that low prices of wheat have been due not to larger production, but to the decline in the value of silver. The table is well prepared, and is suggestive in its presentation.

PROBLEMS OF POPULATION.

Marriage Rates and Marriage Ages, with special reference to the growth of population. By Dr. William Ogle. In *Journal of the Royal Statistical Society* (London), June, 1890. Pp. 253-289.

The author advances the theory that there is an intimate relation between the marriage rate in England and the value of exports. In discussing the possible effects which wars or high price of wheat might have upon a disposition to marriage, he finds the first insignificant in England, and any actual effect of the second is denied. Contrary to a general belief, it is asserted that the marriage rate varies not inversely but rather directly with the price of wheat. A truer index is found in the value of exports which in turn may be taken as an indication of industrial activity. In the period 1839-88 there are only five years in which the marriage rate moved in a different direction from the export value. The graphic curves illustrating this are very striking. A comparison is also made between the marriage rate and the proportion of unemployed in certain trade unions, as given in recent labor statistics of the Board of Trade, and here again the correspondence in the respective fluctuations is very close. Even in the Glass Bottle Makers of Yorkshire United Trade Protection Society, with a small membership of 1600, it is found that "the fluctuations in the employment of this minute body of men correspond

closely in their directions with the fluctuations in the marriage rate of the entire country." Further analysis shows that marriages are more numerous in England in those countries where women are earning independent wages.

The concluding portion of the paper is devoted to a consideration of the various causes which might bring about a stationary population, for Dr. Ogle thinks that the present rate of increase will shortly reach "its permissible limits." His judgment is that "it is manifest that if the growth of population is hereafter to be arrested, and a stationary condition produced, either by emigration, or by increase of permanent celibacy, or by retardation of marriage, these remedies will have to be applied on a scale so enormously in excess of any experience as to amount to a social revolution."

The movement of the population in France in 1889 has not been so uniform in its elements as in preceding years. Births have been more numerous than was anticipated in view of the regularly falling returns of previous years. The births in 1889 were 880,570 against 882,639 in 1888, that is, a decrease of only 2,060. In 1888, however, the loss was 16,794 as compared with 1887. At the same time there has been a smaller number of deaths, 794,933 in 1889 as compared with 837,867 in 1888. The result of this has been to make a net addition to the population of 40,874, a gain which has not been noted since 1885. The marriage rate, however, fell in 1889, a fact which does not augur well for the future. The numbers of marriages was 272,984, or 3,914 less than in 1888. The proportion of marriages was only 7 per 1,000 of the population.

Attention is here called to extracts of an article on *French and English Mortality* published in the "Miscellany."

At the annual meeting of the British Association for the advancement of Science, held in September at Leeds, a striking address was made by Mr. E. G. Ravenstein, upon the question of the lands of the globe still available for European settlement. Mr. Ravenstein estimates the present population of the world at 1,468,000,000 with an increase of 8 per cent every 10 years. To fertile or comparatively fertile land he assigned 28,000,000 square miles; to bare grass lands, or steppe, 14,000,000; and to bare desert, 4,180,000. For the bare desert land he allowed a possible population of 1 to the square mile; to

the poor grass land, 10 ; while to the fertile area he regarded 207 to the square mile as a moderate estimate. This last ratio is based upon the known density of population in such countries as China, Japan, and India. The earth, upon this calculation, could sustain 5,994,000,000 people ; and if the population continued to increase at the rate of 8 per cent per decade, that maximum would be reached in 182 years. In commenting upon this address the London *Economist*, September 13, expresses the opinion that this is an underestimate, the possibilities of agricultural production not being taken into account.

A full, if not verbatim, report of Dr. John S. Billings' *Lectures on Vital and Medical Statistics*, delivered as the Cartwright Lectures before the Alumni Association of the College of Physicians and Surgeons, New York, in 1889, was published in the *Medical Record* of November 30, December 7 and 14, 1889. The lectures are illustrated by diagrams.

Twenty-first Annual Report of the State Board of Health of Massachusetts. Boston. 1890. Pp. 457.

Two special reports in this volume are of general interest, *The Physique of Women in Massachusetts*, by Dr. H. P. Bowditch, pp. 285-304 ; and *The Influenza Epidemic of 1889-90*, by Dr. Samuel W. Abbott, pp. 385-442. Dr. Bowditch in earlier reports has contributed two articles upon the *Growth of Children*, based upon the study of some 24,500 measurements of pupils of the Boston public schools. The present article is an attempt to obtain a fairly correct idea of the physical type of the adult young woman in the vicinity of Massachusetts, based upon a set of 1107 observations. The tables refer to the height, weight, sitting height, and stretch of arm of the women observed ; and the returns are compared in some instances with similar observations made by Dr. Sargent and Mr. Galton. Dr. Bowditch has also made use of the statistical methods used by Mr. Galton, described in *Natural Inheritance*.

In the paper by Dr. Abbott a complete history of the epidemic is given, and as a result of special investigation made at the time some interesting conclusions are arrived at. The ratio of the population in Massachusetts attacked was about 40 per cent, or about 850,000 persons. The ratio of persons in industrial establishments who were obliged to leave their work on account of illness was about 27 per

cent of the whole number employed, so that it is computed the loss to the state amounted to several million dollars. The ratio of deaths to those attacked was 31 per 10,000. Several charts are added comparing by curves the death rate in a large number of European cities during the epidemic period.

DAVIS R. DEWEY.

MINOR NOTICES.

A Preliminary report on the cost of production. Pig iron, steel ingots, steel rails, coal, coke, iron ore, and limestone. By the Commissioner of Labor. Washington. 1890. Pp. 61.

For some time it has been known that the Department of Labor, under the direction of Hon. Carroll D. Wright, was at work collecting data in regard to the cost of producing certain staple commercial products in this country and in Europe. Besides the industries referred to in the above title the investigation will include the cotton and wool, glass, linen, silk, and earthenware industries. The information when published will exhibit an analysis of materials used, taken from the books of the establishments; the efficiency of labor or the proportionate cost of labor to the whole as determined from pay-rolls; and finally the cost of living. The full report will be published in three or four volumes. It speaks well for the high standing of this Department in Europe "that a sufficient number of manufacturers have been found in different countries who were willing for the purposes of science to furnish the information desired."

This preliminary report embraces data from 412 establishments. In arriving at the cost of production "only those elements of cost which are universal, positive and absolutely essential" are included. For this reason, interest, insurance, depreciation of the value of plant and charge for freight of product to place of free delivery have been excluded. The elements of cost taken, include materials, labor, payments to officials and clerks, supplies and repairs, and taxes.

The value of this report when complete can hardly be overestimated; and to the careful investigator this preliminary report will throw light upon many disputed industrial questions involving statistical analysis.

D. R. D.

Some Experiments on behalf of the Unemployed. By Amos G. Warner, Ph.D. In *Quarterly Journal of Economics*. October, 1890.

Contains four statistical tables compiled or translated from German sources. The subjects are: 1. Statistics of the German laborers' colonies, with age, marital state and religion, and industrial standing of the inmates. 2. Length of stay and balance of earnings due at departure of all ex-colonists at certain colonies. 3. Length of stay and cause of departure of all leaving sixteen colonies, 1886-87. 4. Persons convicted of crimes or misdemeanors in fourteen colonies, 1886-87. The whole article is in line with Dr. Warner's previous statistical studies of the subject of pauperism.

Number 17 of the supplements of Conrad's *Jahrbücher für Nationalökonomie und Statistik*, pp. 60 (Jena, 1890), is devoted to a review of Life Insurance in Germany for 1889. An annual review of this nature has been published for some forty years, though only since 1884 in Conrad's *Jahrbücher*. The general plan and scope of the statistical tables has been uniform from the beginning; and the work has long been regarded as authoritative and valuable to the insurance profession. The tables are very complete, affording a picture of the development of life insurance since 1829.

It is, perhaps, not too late to direct attention to an important tabulation published in the *Spectator* (New York), Oct 10, 1889, prepared by Mr. Walter C. Wright, showing the death rate based on 9,029,408 yearly exposures for a maximum period of 64 years, as determined by seven different enumerations of mortality experience. The table exhibits in detail the number of lives exposed, the number of deaths, and the death rate of each year of assurance.

The thirty-ninth issue, 1890, of *Otto Hübner's Statistische Tabel*, now published by Dr. Fr. von Juraschek, continues the previous tabulations with suitable revisions to bring it down to date.

The Massachusetts Bureau of Statistics of Labor, under date of Oct. 1, 1890, has issued a second circular letter, announcing the Publications, now in print, which the Bureau will be glad to distribute to applicants upon payment of postage. It is stated that the Bureau library contains 7500 books or pamphlets devoted to statistical subjects.

In the *Annual Report of the Chief Signal Officer of the Army, for the year 1890* (Washington, 1890, pp. 36), it is announced that the percentages of successful forecasts during the past fiscal year were 84.4 for weather, 78.7 for temperature, and 82.6 as a general average. This is an increase in accuracy of 1.7 per cent over 1889. During the year 1,112 storm signals were ordered, of which 1,040 were justified as to direction; 695 justified wholly as to velocity, and 59 partly as to velocity. Long time forecasts of weather and temperature were issued at the discretion of the forecast official with a successful percentage of 81.6 for 48 hours, and 80.5 for 72 hours. For 48 hours 1,833 predictions were made; and for 72 hours, 146. It appears that 98 per cent of all the important cold waves were predicted. A special paper on tornadoes is announced to appear in the full report, and the remarks of the chief signal officer in regard to securing a unit of comparison for tornado damage are of general statistical interest. The officer in charge of this investigation, Mr. Hazen, divided tornadoes into three classes: (1) violent storms causing destruction; (3) the most severe tornadoes, and (2) all other known violent storms. In classes 1 and 2 there were about 1,000 tornadoes each, for the total period covered, which caused the death of 1,071 people, or an average of one person to two storms, and a financial loss of about \$23,000,000. In class 3 there were 58 tornadoes, killing 755 people and destroying about \$12,000,000 of property.

"It is well settled that in the last eighteen years the annual death casualties from tornadoes average 102 annually. While this is a large number, yet it does not appear to be as great as the death casualty from lightning, since, during the present year from March to August, inclusive, there were 102 lives lost by lightning, and in compiling this record the list is incomplete, especially as regards the Southern States."

MISCELLANY.

FRENCH AND ENGLISH MORTALITY.

The following paragraphs are taken from an article published in *London Times* (weekly edition), Sept. 26, 1890.

"In the first place, if sanitary conditions were equal, France ought to have a considerably lower death-rate than England, since its birth-rate is about only 23 per 1,000 of population against our own 31, and consequently there are less children of an age when the mortality is greatest. But, on the contrary, the death-rate for France during the five years 1884-88 was 22.3 per thousand, while that for England was under 19. The difference between these figures is really tremendous, for it means, in effect, that in a given population there are seven deaths in France for six in England. And if we proceed to analyse the cause of the higher mortality, it is pretty plain that it is due to imperfect sanitation. Unluckily, the French registration system is very defective, and there are no means of ascertaining with accuracy the number of deaths occurring throughout the country from particular diseases. As regards fever, for instance, the mortality cannot be precisely stated; but an official report addressed to the Comité d'Hygiène a couple of years ago estimated that it caused about 21,350 deaths annually, or about 600 per million of population. In England and Wales the yearly deaths from it are about 5,000, or 170 per million. Roughly calculated, therefore, there is about three times as much fever in France as in England. But although no detailed statistics as to the whole country are obtainable, the Bureau de l'Hygiène has of late years published a classified return of mortality in such towns of France as have a population over 10,000, and this return tells a tale. It will be convenient, in the first place, to compare the figures for Paris with those relating to London. These two are, according to Professor Marshall's "Economics," the two largest manufacturing towns in the world, and their inhabitants have many conditions in common. In the five years ending with 1889 the general death-rate of Paris was 23.5. That of London was 19.0. This difference is startling, but an analysis of the causes of death brings out still more striking results. It may be said without hesitation

that the two diseases which are most directly influenced by sanitary conditions are enteric (typhoid) fever and diarrhœa. It is only where water is polluted, where sewerage is defective, or where earth and air are fouled by accumulations of filth, that these diseases flourish. In the same five years the average annual number of deaths from enteric fever in Paris was 1,072. In London, with almost exactly twice the population, the number was 612. In other words, in a given population there was between three and four times as much fever in Paris as in London. As regards diarrhœal diseases, the deaths in Paris averaged 4,126, those in London, 3,167, the Paris mortality from this cause being proportionately nearly three times that of London. The reasons are not far to seek. In London, though there are plenty of shortcomings in the sanitary administration of particular districts, we have the advantage of possessing an efficient system of sewerage and water, which if it does not attain a standard of ideal purity, nevertheless passes the most exacting tests which analysis can apply. In Paris, not only are a good many of the sewers badly made and insufficiently ventilated, but (unless alteration has been recently made) some thousands of houses still drain into cesspools (*puisards*), and filth thus accumulates for months in the midst of a crowded population.

"But if the sanitary condition of the capital leaves much to be desired, that of many of the provincial towns is far worse; and in some of them the number of deaths from preventable diseases is really appalling. It is worth while to examine the last statistical return published, which is that for 1888, bearing in mind, by the way, that the year in question had, with one exception, the lowest mortality of the last quarter of a century. It may be noted for comparison that the general death-rate in 1888 of the 28 largest towns in England was 19.2, the highest being Manchester (26.1). In the 29 largest provincial towns of France the average general death-rate was 25.4. Marseilles had a general death-rate of nearly 29, Havre of $35\frac{1}{2}$, Rouen of $33\frac{1}{2}$, Montpellier of 33, Brest of 32, Dieppe of 32, Reims of 31, and so on. Among the smaller towns there are higher figures still. Ivry, for instance, near Paris, had a death-rate of 43; Lambézellec, a town of some 16,000 inhabitants not far from Brest, had the same damnable figure; so had its neighbor Morlaix; while Douarnenez, with a population of 11,000, also in the Finistère, actually reckons a mortality of 53 per 1,000. In English towns, among each

10,000 of the population, two persons died in 1888 of fever, and six of diarrhœa. The corresponding rates in the 29 largest provincial towns of France averaged 6 and 23 respectively, or three times as much fever and nearly four times as much diarrhœa as in England. In Marseilles they were 10 and 30 respectively, in Havre 26 and 30, in Lorient 28 and 4, in Rouen 8 and 74, in Cherbourg 24 and 19, and in Brest 11 and 20.

MULHALL ON STATISTICAL COMPUTATIONS.

In an article on *The Study of Statistics*, published in the *Contemporary Review*, October, 1890, Mr. Michael G. Mulhall finally throws light upon some of his statistical methods which have long puzzled students endeavoring to authenticate his conclusions. He devotes one section to what he terms Speculative Statistics in the following manner:—

“These come under Jevons’ definition, ‘occupying the debatable ground between ascertained fact and reasonable conjecture.’ According to the official school they are not statistics at all, but guesses, more or less accurate, and of no scientific value whatever.

“Nevertheless, they constitute a very high order of statistics, and are by no means of that vague and uncertain character which opponents insinuate. Let us give a few illustrations. Some one inquires: ‘What are the numbers of Anglicans, Roman Catholics, etc., in England?’ The official statist replies: ‘It is not known, because the census takes no cognizance of creeds.’ But I answer: ‘We know perfectly well, for the Registrar-General’s returns shows that 72 per cent of the marriages are performed in the Church of England, 4 per cent in Catholic Churches, and 24 per cent among Dissenters.’ Somebody else asks: ‘What is the consumption of eggs in the United Kingdom?’ The official statist replies: ‘We can tell you the number imported, but not the home production.’ And I answer: ‘We have 20 million hens, which lay usually 90 eggs each per annum, from which, deducting 10 for hatching, we have 1600 millions home product, and 1100 millions imported last year: in all, about 2700 millions, or 73 per inhabitant.’ A third person asks: ‘What is the consumption of meat in the United Kingdom yearly?’ The official statist replies: ‘Unscrupulous persons may make a guess, but we

really don't know.' I reply: 'The consumption can be ascertained to 1 lb. per inhabitant, by the scale already given in my observations on food-supply.' A fourth inquires: 'What is the value of shipping and merchandise lost yearly at sea?' The official statist says: 'Heaven only knows.' And I reply as follows: 'The insurance agencies charge $1\frac{1}{4}$ to $2\frac{1}{4}$ per cent; hence, the losses must average about 1 per cent. The shipping in 1883 was 21,600,000 tons, and the merchandise carried over sea 153,000,000 tons. The loss was therefore:—

216,000 tons shipping, value	£2,400,000
1,520,000 " merchandise	27,400,000
Total	<u>£29,800,000</u>

The value of merchandise was £18 per ton, since that was the average in 1883 obtained by dividing the imports of all nations by the tonnage of entries. A fifth asks: 'What is the value of British manufactures?' To which the official statist replies: 'You might as well ask how many gallons of water are in the Atlantic Ocean.' And I reply in the way already shown, treating of manufacturing statistics, in which the hardware manufactures appear to reach 154 millions sterling per annum, and textiles by multiplying the value of fibre by two and a half. A sixth inquires: 'What are the annual earnings of the British nation?' And the official statist replies: 'These are matters beyond the reach of mortal ken, unknown even to experts such as we.' And I reply briefly as follows: 'The earnings are easily ascertained by summing up the following:—

1. The rent of houses and lands, or rental valuation.
2. The value of food consumed in the year.
3. The value of cotton, woollen, linen, etc., goods consumed.
4. The cost of fuel, gas, and kerosene.
5. The amount paid for transport, say double the railway earnings.
6. The sums expended in national and local taxes.
7. Three per cent on the above gross sum, for learned professions.
8. The annual accumulation of wealth.

These make up 1260 millions sterling.'

'A ninth person asks: 'What is the wealth of the United Kingdom, France, and the United States?' The official statist replies as before: 'There are some things forbidden for man to weigh or estimate, and this is one.' And I answer: 'Public wealth consists of

ten items, all of which can be measured to a nicety, except one, the value of public works. Land, for example, is worth thirty times the assessed annual rental valuation. Houses are worth eighteen times the rental. Furniture (according to insurance agents) is always worth half the value of the house. Cattle, railways, and shipping offer no difficulty. Merchandise may be taken at six months' imports and exports; and as for public buildings and works, we find churches cost £10,000 each, schools £1000, and high-roads £500 per mile.' The values thus summed up show:—

United States,	13,600 millions sterling.
United Kingdom,	9,600 “
France,	9,100 “

MORTALITY VS. IMMORTALITY.

In an article with the above heading the *Boston Medical and Surgical Journal* justly criticises certain current methods of statistical reasoning. Parts of the article are given below.

“The Supervising Surgeon-General of the United States Marine Hospital Service in a recent weekly abstract of sanitary reports presents the following refreshing bit of information in the shape of a quotation from the *Monthly Bulletin of the State Board of Health of Iowa*, for June, 1870.

‘In 1880 the annual death-rate of Iowa was 16 per 1,000 of the living population. In 1885, with an increase of population of 225,297, the annual death-rate was 4.5 per 1,000 of the population. In 1890, with an estimated population of 2,193,477, an increase of 340,564, the annual death-rate is estimated at a fraction over 4 per 1,000. In 1883 it was only 3.7 per 1,000 of the population.

‘The records show that fully 70 per cent of the total deaths in 1880–81–82 were caused by contagious, and therefore preventable, diseases. It was not till 1883 that the work of the State Board of Health began to be realized. The saving of lives, therefore, through the sanitary and protective measures of the State Board is a record to be proud of. It is a record worthy the consideration of every thoughtful mind.’

“In the original report, from which the above statement is quoted, the following data are also printed:—

Cities.	Total deaths.	Population.	Death-rates.
Burlington,	352	30,000	11.66
Clinton,	228	17,000	1.30
Council Bluffs,	229	85,000	0.06
Cedar Rapids,	278	16,000	1.70
Davenport,	438	33,715	12.09
Des Moines,	438	58,000	0.75
Dubuque,	327	35 000	9.28
Keokuk,	192	13,151	12.00
Mt. Pleasant,	65	1,500	4.50
Ottumwa,	169	16,000	0.94

"The foregoing statistics are worthy of the genius of a Squeers. The conventional mode of expressing a death-rate is as a ratio per one thousand of the living population. The go-as-you-please method of the Iowa Board of Health can hardly be recommended for general adoption. Mortality is the common lot of all mankind, and it is quite plain that there is such a condition as a healthy, or, to use a better term, normal standard as a mortality-rate for a given community or population. By this is not meant the mortality-rate of selected classes."

"The mortality of city populations, large and small, in the United States, may be stated, with few exceptions, as from eighteen per thousand upwards; and for rural populations in well-settled districts as from eleven per thousand and upwards. But when such figures as 3.07 per thousand for a single year for a population of about two millions are quoted, it is time to call for a recount of ballots, and to inquire what are the sources from which such an estimate is made. It is not strange that such claims are made by a Western state; but when the head of a department which assumes to itself much of the sanitary care of the nation, and is supposed to be an authority in vital statistics, publishes such data seriously as a contribution to the vital statistics of the country, we would respectfully call them in question."

REVENUE STATISTICS OF ENGLAND.

In an article on *The Half-Year's Revenue*, the *London Economist*, Oct. 4, 1890, comments upon the unsatisfactory form and the indefiniteness of the Revenue statistics as presented by the Treasury. Readers of *Statistics of Municipal Finance*, by Dr. H. B. Garduer,

and of *Finance Statistics of the American Commonwealths*, by Prof. E. R. A. Seligmann, will be especially interested in the criticism.

"A false impression has been created by a mixing up of Imperial and local funds, which renders the Treasury return so indefinite and misleading that it is really impossible to ascertain from it how matters actually stand.

"One word must be added as to the form in which the returns are rendered. That has been improved lately, but that it stands in need of still further improvement is sufficiently obvious from the fact that all the process of analysis through which we have gone is necessary in order to arrive at an approximation to the true facts, and that not even by the most careful analysis is it possible to ascertain exactly what portion of the total receipts constitutes Imperial revenue, and which portion belongs to the local authorities. And, in passing, it must be said that this is only one of the complications that Mr. Goschen has introduced into our system of account. What with special funds of one kind and another,—defence funds, local finance funds, etc.,—the accounts have been so muddled up that we feel confident not one member of the House of Commons out of a hundred could, if called upon, say exactly how our finances stand. And where there is this ignorance, how can there be efficient financial control? Complete and easily intelligible accounts are the *sine qua non*, if we are to have efficient Parliamentary supervision, and one of the first reforms to be effected should be the separation of the local revenues from the Imperial. It is true the present system of passing the local funds through the Treasury gives the Chancellor of the Exchequer the temporary use of money which belongs to other authorities; but what he gains they lose, and if there is profit to be made by the use of the funds allocated to local purposes, it is the local authorities and not the Imperial Exchequer that these profits should go to."

VITAL STATISTICS OF TRINIDAD, B. W. I.

In a paper entitled *Our Population: A review of the vital statistics of Trinidad, B. W. I.* (June, 1890, pp. 28), the author, Henry James Clark, the Government Statist, arrives at the following general con-

clusions, which are of interest as indicating a phase of the population problem, often referred to in colonial reports.

"It seems only natural to assume that it would be wiser to increase our stock of labor by preserving the infant life among our own people than to rely for that increase upon an expensive system of imported labor, and that, therefore, even from this low point of view the excessive infant mortality revealed in the facts and figures of this article calls loudly for some effort to check its increasing proportions, so as at least to minimize the number of deaths from *preventable* causes. The marked success of the Gordon Ward, and its already wide popularity, point strongly to the establishment of Day-homes, or *Crèches*, where, for a nominal consideration, children could be kept and tended during the absence of the mothers at work, as likely to be of incalculable benefit in saving infant life."

"That seeing an increase in the proportion of women to be introduced among our East Indian immigrants would displease lead to a large increase in the birth-rate of that class of our population, such increased proportion, even if attended by increased expenditure, becomes from the standpoint of population a simple question of present or deferred expenditure, while the many other self-evident advantages that would accrue from it seem, to the writer, largely to outweigh any monetary consideration that might be urged against it."

"That, leaving aside all higher considerations, and looking solely to their effect in checking the natural increase of our population, the two great blots on the social and moral life of the colony, concubinage and illegitimacy, deserve far more attention than they have hitherto received."

"That the large proportion which our hospital deaths bears to our total deaths, and the equally large proportion among those deaths occurring soon after admission, point clearly to a certain amount of preventable *adult* mortality, and to the urgent need of some reform in our present system of out-door relief and medical attendance on the sick poor. In this connection the writer is of opinion that every encouragement should be given to Friendly Societies (of which several have recently been started), one of whose main objects is to secure for members and their families, when ill, better and more regular medical care and attendance."

THE ENGLISH CENSUS.

The report of the committee appointed by the Treasury to inquire into certain questions connected with the taking of the English census includes among its recommendations the following :—

“(a) that the number of the population, and its distribution as regards age and sex, be ascertained midway between the decennial periods at which a full census is taken ;

“(c) that if the enumeration be taken more frequently than hitherto a small permanent census branch of the department of the Registrar-General be established in England, if not also in Scotland and Ireland ;

“(d) that, except to the extent to which second division clerks may be employed under the conditions which have been proposed by the Registrar-General for England, the census clerks selected for employment under that officer be chosen by open competition within suitable limits of age ;

“(e) that the special attention of superintendent registrars and registrars be called to the importance of a very careful selection of enumerators ;

“(f) that, in addition to the information hitherto obtained, columns be added to the householders' schedule for enabling persons to be returned either as employers, employed, or neither employers nor employed, the propriety of publishing such returns to be a matter for subsequent determination ;

“(g) that the term ‘rank’ be omitted from the column hitherto provided for ‘rank, profession, or occupation’ ;

“(h) that persons following no occupation, but deriving an income from property and other sources of a permanent character, be so returned, and that they be separately tabulated in the published reports ;

“(i) that provision be made at the foot of the householders' schedule for a statement as to whether the number of rooms occupied is less than five, the actual number in that case to be given, the publication of the results to be afterwards decided as under (f).”

TABULAR STANDARD OF VALUE.

At the recent September meeting of the British Association the following proposal for an official index number to serve as a tabular

standard of value was submitted by a committee appointed for that purpose.

“(1) A special commission to be appointed to collect prices of such principal articles of production and consumption as may, from time to time, be directed by Order in Council.

“(2) The commission is to appoint inspectors of prices in towns, and to direct by Order in Council that persons buying and selling in these towns, &c., are to make returns in the prescribed form to the inspector.

“(3) Persons failing to make a return, or making a false return, are to be liable to a penalty of £20 on conviction.

“(4) The commission shall publish, from time to time, in the *Gazette*, in the prescribed form, the prices so obtained.

“(5) The commission shall also publish a statement of the average prices of each of the specified articles for the ten years immediately preceding and for each of these years; and the prices so declared shall be taken to be the par prices for the purpose of this Act.

“(6) In January the commission shall publish the prices for the previous year; and a table of the proportion of these prices to the par prices, each of the par prices being reckoned for this purpose as 100, and the proportion in each case being stated in the form of the proportion to 100. The sum of these proportions shall also be stated. The table may be divided into parts, and the sum of the proportions in each part stated separately. The sum of the par prices, each reckoned as 100, shall be called the par index-number, and the proportionate index-number for each year: and the sum of the par prices for each part, and of the proportions in each year, shall be called the par index-number, and the proportionate index-number for each part.

“(7) It shall be lawful in all contracts for payments in money to express that the payment is to be made for a given year in the proportionate index-number for that year, either for the whole of the said table or for a part of it, and thereupon payment may be made in such sum of sterling money as will correspond in respect of the sum contracted to be paid to the proportion which the proportionate index-number bears to the par index-number.

“(8) Unless where stipulated to the contrary, all pensions, annuities, and salaries receivable and payable by the government, and which may be fixed after the passing of this Act, shall be paid in the proportionate index-number.

“(9) New articles may be introduced into the list and the table, from time to time, by Order in Council.”

CHARITY STATISTICS.

In the *Report of the Committee on Charity Organization*, Mr. Nathaniel S. Rossman, chairman, made at the Seventeenth Conference of Charities and Corrections, May, 1890, criticism is made of the unsatisfactory results obtained in connection with the preparation of the statistical portions of the report. The Report continues as follows:—

“At the Conference of Charities in Buffalo, the representatives of the various societies adopted a blank for the collection of statistics, which was designed to be used by all the societies in the country. Twenty-eight societies agreed to use these blanks, but only eight appear to have lived up to their agreement. With this small result in hand, it is not worth while to attempt any investigation either as to the work of charity organization in general, as to the causes of pauperism, or as to the direct results of charity work. There is a decided need for reliable statistics with regard to the poor and pauperism, and there is no better vehicle for conveying such information than a charity organization society. All of the societies are at work trying to reduce pauperism, and all are succeeding in a measure. But nobody has yet been able to lay down a general rule for work; nobody has yet been able to give general causes for destitution, because reliable figures, covering any considerable portion of our population, have not yet been furnished upon which premises can be based.

“A cardinal principle of scientific charity is to search out causes of distress, in order that work may be begun at the foundation of the trouble. Yet, with all the facilities and opportunities in the hands of the seventy-eight societies in the United States, nothing has ever been given to the economist of sufficient basic value for the study of sources of poverty.

“The blanks as prepared by the New York society, pursuant to the resolution of the meeting at Buffalo, are inexpensive, and the labor of filling them out from week to week is not great; and we urge, with the utmost earnestness, that every society in the country should at once devote its attention to this work, which is by no means the least important it can perform.”

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THE GROWTH OF CITIES IN MASSACHUSETTS.

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Massachusetts is no longer the Puritan Commonwealth. It is the Commonwealth of Cities. The same causes that have made the first title inapplicable have rendered the second appropriate. The changes which are in some respects revolutionary, yet entirely peaceful, have taken place within the memory of men still young.

In 1820 there were no cities in the State, and but two towns large enough to become cities under our present statutory requirements. These towns were Boston, with 48,298 inhabitants, and Salem, with 12,781. Both were commercial municipalities, and to their early settlement in favorable locations upon the seaboard their prominence was due. The population of Massachusetts was then 523,287, and the population of Boston and Salem together being 56,029, it will be seen that these places, each of which contained more than 12,000 inhabitants, the minimum limit of city population, comprised about 11 per cent of the population of the State. The remaining 89 per cent was distributed among 300 towns, very few of which contained 3,000 inhabitants.

The following table shows the population of cities in Massachusetts in 1890 and at five antecedent periods. The absence of figures in the column for any year indicates that the mu-

municipality opposite the name of which the omission occurs was not then a city.

CITIES.	Population of Cities existing in —					
	1840	1855	1865	1875	1885	1890
Boston.....	93,383	160,490	192,318	341,919	390,393	448,477
Charlestown.....		21,700	26,399			
Roxbury.....		18,469	28,426			
Worcester.....		22,296	30,055	49,317	68,389	84,655
Lowell.....	20,796	37,554	30,990	49,688	64,107	77,896
Fall River.....		12,680	17,481	45,340	56,870	74,398
Cambridge.....		20,473	29,112	47,838	59,658	70,028
Lynn.....		15,713	20,747	32,600	45,867	55,727
Lawrence.....		16,114	21,698	34,916	38,862	44,654
Springfield.....		13,788	22,035	31,053	37,575	44,179
New Bedford.....		20,389	20,853	25,895	33,393	40,733
Somerville.....				21,868	29,971	40,152
Holyoke.....				16,280	27,896	35,637
Salem.....	15,062	20,934	21,189	25,958	28,090	30,801
Chelsea.....			14,403	20,737	25,709	27,909
Haverhill.....				14,628	21,795	27,412
Brockton.....					20,783	27,294
Taunton.....			16,005	20,445	23,674	25,448
Gloucester.....				16,754	21,703	24,651
Newton.....				16,105	19,759	24,379
Malden.....					16,407	23,031
Fitchburg.....				12,289	15,375	22,037
Waltham.....					14,609	18,707
Pittsfield.....						17,281
Quincy.....						16,723
Northampton.....					12,896	14,990
Chicopee.....						14,050
Newburyport.....		13,357	12,976	13,323	13,716	13,947
Marlborough.....						13,805
Woburn.....						13,499
Totals.....	129,261	393,947	504,687	836,933	1,087,496	1,372,300

The town ranking next to Salem in size was Nantucket, with its thriving fisheries, its population being 7,266. Other large towns on or near the seaboard were the following: —

Newburyport.....	6,852	Andover.....	3,889
Charlestown.....	6,591	Barnstable.....	3,824
Gloucester.....	6,384	Dorchester.....	3,684
Marblehead.....	5,630	Newbury.....	3,671
Middleborough.....	4,687	Dartmouth.....	3,636
Taunton.....	4,520	Danvers.....	3,616
Lynn.....	4,515	Scituate.....	3,305
Plymouth.....	4,348	Cambridge.....	3,295
Beverly.....	4,283	Haverhill.....	3,070
Roxbury.....	4,135	Rochester.....	3,034
New Bedford.....	3,947		

The largest town in Worcester county was Worcester, with 2,962 inhabitants; in Hampshire, Northampton, 2,854; in Hampden, Springfield, 3,914; in Berkshire, Sheffield, 2,476; and in Franklin, New Salem, 2,146, then nearly as large as Worcester, but now having a population of 832.

One who then looked over the State would have said that Nantucket, Marblehead, and Barnstable possessed possibilities of growth far superior to Worcester. Their excellent harbors would have been thought an advantage which no inland town could possibly overcome. Springfield indeed was upon a river, but Worcester was simply a town among the hills. Evidently Nantucket, Marblehead, and Barnstable shared with New Bedford, Salem, Gloucester, and Newburyport the promise of future greatness. The prophet who might have predicted that these were the nuclei of our largest cities would not have been without honor in his own country, but would have illustrated a recent definition of prophecy as "that which never becomes true." Worcester is now our second city, while the glories of Nantucket, Barnstable, and some of the other coast towns are in the past. But in 1820 neither the railroad nor the factory system had been perfected. Lowell and Lawrence were unborn. Fall River was a town of 1,504 inhabitants, and Holyoke was tillage land in the village of West Springfield.

Lowell was founded in 1826. In 1830 it had 6,474 inhabitants. The migration from the country toward the factory town had begun. Boston became a city in 1822; Salem and Lowell followed in 1836. The census of 1840 thus found three cities in Massachusetts, their aggregate population being 129,261, or 17.52 per cent of the total population of the State. Besides these, New Bedford had passed the twelve-thousand limit, but had not yet become incorporated. Fifteen years later, in 1855, the first decennial State census was taken. Thirteen cities now existed, the additions subsequent to 1840 being Charlestown, Roxbury, Cambridge, New Bedford, Fall River, Lawrence, Lynn, Newburyport, Springfield, and Wor-

cester. The population in cities had become 398,947, or 34.78 per cent of the total population, and Taunton, still under a town government, contained 13,750 inhabitants.

Taunton became a city in 1864. Chelsea had preceded it in 1857. At the close of the war, therefore, Massachusetts contained 15 cities, their aggregate population being 504,687, or 39.83 per cent of the population of the State. The cities at that time comprised every municipality containing a population in excess of 12,000. The population of Boston had become 192,818; of Lowell, 30,990; of Worcester, 30,055. No other city exceeded 30,000.

The era of expansion immediately followed, especially the expansion of manufactures. New enterprises were started, old ones enlarged. Immigration at once increased. The foreign born population which at the close of the war had been about 21 in the 100 became 10 years later nearly 26 in the 100. Still, in 1875, out of the total population, 59 in the 100 were of Massachusetts nativity.

Haverhill, Somerville, Fitchburg, Holyoke, Gloucester, and Newton were added to the list of cities between 1865 and 1875, and Charlestown and Roxbury were merged in Boston, which also took on the towns of Brighton, Dorchester, and West Roxbury.

In 1875, then, we find 19 cities, aggregating 886,933 inhabitants. The towns now had but 814,979. That is, 50.66 per cent of the population of the State was in the cities. The State had gained 30.38 per cent in the decade, but the gain upon territory within the city limits had been 44.06 per cent. To express it differently, 66.51 per cent of the gain in the State was made in the municipalities then under city government. Ten years later, in 1885, Brockton, Malden, Northampton, and Waltham had been added to the list of cities. The city population had become 1,087,496, a gain of 23.66 per cent upon the population of the same municipalities in 1875. The State had gained but 17.57 per cent, and nearly 72 per cent of its gain was made upon territory within

the city limits. The towns had gained but 10.64 per cent upon their population in 1875, and nearly 60 per cent of the total population was in the cities. The State, which 10 years before had found the majority of its inhabitants in urban instead of rural districts, now found the majority of foreign instead of native descent.

The proportion of foreign born was now about 27 in the 100, not greatly in excess of the proportion found in 1875, but only about 44 persons in the 100 were of native parentage, and the proportion was considerably less in some of the cities. How largely the cities have contributed to this change may be seen from the following table, representing conditions in 1885, but which have probably not changed since, except to increase the percentage of foreign born.

CITIES.	Percentages of Foreign Born of Total Popu- lation 1885.	Percentages of Native Born of Total Popu- lation 1885.	CITIES.	Percentages of Foreign Born of Total Popu- lation 1885.	Percentages of Native Born of Total Popu- lation 1885.
Boston.....	34.14	65.86	Gloucester.....	32.32	67.68
Worcester.....	29.51	70.49	Newton.....	27.81	72.19
Lowell.....	40.37	59.63	Malden.....	26.41	73.59
Fall River.....	49.16	50.84	Fitchburg.....	23.98	76.02
Cambridge.....	32.16	67.84	Waltham.....	27.47	72.53
Lynn.....	21.30	78.70	Pittsfield.....	23.32	76.68
Lawrence.....	43.99	56.01	Quincy.....	30.24	69.66
Springfield.....	23.79	76.21	Northampton.....	26.01	73.99
New Bedford.....	30.71	69.29	Chicopee.....	39.79	60.21
Somerville.....	25.02	74.98	Newburyport.....	19.00	81.00
Holyoke.....	49.79	50.21	Marlborough.....	26.17	73.83
Salem.....	27.06	72.94	Woburn.....	30.00	70.00
Chelsea.....	25.60	74.40			
Haverhill.....	19.09	80.91			
Brockton.....	19.40	80.60	The Cities (aggregate)...	32.35	67.65
Taunton.....	27.75	72.25	The State (except cities)	27.13	72.87

This table shows that, considered in the aggregate, about 33 persons in the 100 in cities are of foreign birth, while in the towns only about 27 in the 100 are of foreign birth.

Since 1885 five cities have been incorporated, namely, Chicopee, Marlborough, Pittsfield, Quincy, and Woburn. In the census of 1890, therefore, 28 cities appear, their aggregate population being 1,372,300; a gain in these municipalities of 223,986, or nearly 20 per cent in five years. Of the population of the State, 61.29 per cent is now found in the cities.

The following table ranks these cities in the order of size, and presents a comparison of growth since 1865, upon the territory now within city limits: —

CITIES.	Population.		Percentages of increase in 1890 as compared with 1865.
	1865	1890	
Boston*	192,318	448,477	133.20
Worcester	30,065	84,665	181.67
Lowell	30,990	77,696	150.71
Fall River	17,481	74,398	325.59
Cambridge	29,112	70,028	140.55
Lynn	20,747	55,727	168.60
Lawrence	21,698	44,654	105.80
Springfield	22,035	44,179	100.49
New Bedford	20,853	40,733	95.33
Somerville	9,353	40,152	329.30
Holyoke	5,648	35,637	530.97
Salem	21,189	30,801	45.36
Chelsea	14,403	27,909	93.77
Haverhill	10,740	27,412	155.23
Brockton	6,332	27,294	331.06
Taunton	16,006	25,448	59.00
Gloucester	11,937	24,651	106.51
Newton	8,975	24,379	171.63
Malden	6,840	23,031	236.71
Fitchburg	8,118	22,037	171.46
Waltham	6,896	18,707	171.27
Pittsfield	9,678	17,281	78.60
Quincy	6,718	16,723	148.93
Northampton	7,925	14,990	89.15
Chicopee	7,577	14,050	85.43
Newburyport	12,976	13,947	7.48
Marlborough	7,164	13,805	92.70
Woburn	6,999	13,499	92.87
Totals (cities)	570,760	1,372,300	140.43
The State (except cities)	696,271	866,643	24.47

* Including Charlestown and Roxbury in 1865.

Besides its cities Massachusetts now contains two towns, North Adams and Brookline, each having a population in excess of 12,000, the city limit. We also have seven others, Medford, Everett, Weymouth, Beverly, Clinton, Hyde Park, and Peabody, already containing more than 10,000, and at their present rate of growth evidently soon to become cities. Now, if we group the cities and towns containing more than 10,000 inhabitants in classes so as to show certain ranges of population we find that the city of Boston, containing a population of 448,477, represents 0.28 per cent of the whole number of cities and towns, and contains 20.03 per cent of the entire population of the State. In this respect it remains about the same as in 1885 when it contained 20.10 per cent of the whole population. Outside of the city of Boston we find no city containing more than 90,000 persons. In the class ranging from 80,000 to 90,000 we find one city, Worcester, having a population of 84,655, or 3.78 per cent of the entire population of the State. In the class ranging from 70,000 to 80,000 there are three cities, the total population being 222,122, or 9.92 per cent of the entire population. There are no cities in which the population ranges from 60,000 to 70,000. In the class ranging from 50,000 to 60,000 there is one city, its population being 55,727, or 2.49 per cent of the entire population of the State. In the class ranging from 40,000 to 50,000 there are four cities, the total population being 169,718, or 7.58 per cent of the entire population of the State. In the class ranging from 30,000 to 40,000 are found two cities, the total population being 66,438, or 2.97 per cent of the entire population of the State. In the class ranging from 20,000 to 30,000 eight cities are found, the total population being 202,161, or 9.03 per cent of the entire population of the State. In the class ranging from 15,000 to 20,000 are found three cities and one town, containing 68,785 persons, or 3.07 per cent of the entire population of the State. In the class ranging from 10,000 to 15,000 are found five cities and eight towns, the total population being 157,003, or of 7.01 per cent of the entire population of the State.

The classes to which we have so far referred, namely, those ranging from 10,000 to 90,000, together with the city of Boston, represent 10.53 per cent of the total number of cities and towns in the Commonwealth, but they contain 65.88 per cent of the entire population.

The population in the territory now comprised within city limits has risen from 623,449 at the close of the war (1865) to 1,372,300, a gain of 120.11 per cent; while the State outside this territory has gained but 34.66 per cent. Massachusetts has gained 76.71 per cent in its population since 1865. To this gain we may well point with pride, but it is scarcely realized how largely the growth is confined to the cities and larger towns.

The population per square mile is now about 278, but this, of course, is in the nature of an average, and therefore misleading. In 35.32 per cent of the total number of cities and towns is found 86.42 per cent of the population, or, to express it more graphically, in about one-third of the cities and towns nearly nine-tenths of the population is found, and no one of these cities and towns has a population less than 3,000.

There are 351 cities and towns in the State, and, notwithstanding the large percentage of gain which I have cited, 143 of these, not quite half, but still approaching it, have a less population than in 1865. The growth of the cities and of the State is largely due to manufactures. That, of course, is well known. The condition of the towns without manufactures is perhaps equally well known in a general way, but not so fully realized. There are 134 towns in Massachusetts in which the annual product derived from agriculture exceeds that derived from manufactures. These towns contained 156,408 inhabitants in 1865. They have in 1890 147,823, a decline of 5.49 per cent. There are 110 towns in which the annual product of manufactures is less than \$100,000 in value. These contained 113,610 in 1865 and have 100,929 today, a decline of 11.16 per cent.

The following table shows the increase in capital invested

and in annual product derived from manufactures in the cities in 1885 as compared with 1865. The absence of figures in the column for 1865 indicates that the municipality opposite the name of which the omission occurs was not then a city.

CITIES.	Capital Invested in Manufactures in Cities existing in —		Value of Product of Manufactures in Cities existing in —	
	1865*	1885	1865*	1885
Boston.....	\$17,764,911	\$73,346,253	\$57,930,110	\$144,376,202
Worcester.....	2,905,310	18,344,408	9,600,992	28,689,524
Lowell.....	10,010,975	37,272,000	12,231,166	29,324,606
Fall River.....	3,175,516	38,419,919	11,329,109	22,915,656
Cambridge.....	1,568,965	11,872,416	4,421,696	15,502,373
Lynn.....	1,445,159	9,987,938	6,714,646	31,100,906
Lawrence.....	5,272,196	22,348,462	15,873,677	18,257,822
Springfield.....	1,520,414	12,024,404	4,138,417	12,528,823
New Bedford.....	2,332,646	15,069,695	6,986,910	11,334,770
Somerville.....	.....	4,255,900	.....	23,791,932
Holyoke.....	.....	17,923,517	.....	15,587,093
Salem.....	2,128,250	6,425,153	4,136,299	9,845,681
Chelsea.....	632,962	3,821,154	1,010,134	4,551,895
Haverhill.....	.....	4,333,861	.....	16,320,707
Brockton.....	.....	4,126,384	.....	13,370,828
Taunton.....	1,689,656	8,900,744	5,755,255	7,325,006
Gloucester.....	.....	2,733,492	.....	5,976,580
Newton.....	.....	1,660,378	.....	2,369,018
Malden.....	.....	4,695,902	.....	4,239,020
Fitchburg.....	.....	5,477,446	.....	6,231,866
Waltham.....	.....	6,774,952	.....	4,491,614
Pittsfield.....	.....	3,891,039	.....	4,488,271
Quincy.....	.....	1,099,251	.....	3,098,649
Northampton.....	.....	3,113,620	.....	3,720,028
Chicopee.....	.....	6,040,606	.....	3,586,213
Newburyport.....	1,145,796	5,512,956	2,560,120	4,644,966
Marlborough.....	.....	1,743,379	.....	6,417,617
Woburn.....	.....	3,547,535	.....	7,105,897
Totals (cities).....	51,572,746	335,362,764	142,697,531	461,223,565
The State (except cities).....	41,813,103	165,231,613	129,261,591	213,410,704
	\$93,385,849	\$500,594,377	\$271,959,122	\$674,634,269

* Currency values reduced to gold basis.

In 1865 the cities represented 55.23 per cent of the capital invested in manufactures, and turned out 52.47 per cent of the product. They now represent 66.99 per cent of the capital, and turn out 68.86 per cent of the product.

For the purpose of indicating the growth of the cities in wealth, I introduce a table showing the increase in 1890 as compared with 1865. As before, the absence of figures in the column for 1865 indicates that the municipality opposite the name of which the omission occurs was not then a city.

CITIES.	Amount raised by Taxation in Cities existing in —		Valuation of Cities existing in —	
	1865*	1890	1865*	1890
Boston.....	\$4,278,053	\$11,187,692	\$262,968,519	\$822,041,800
Worcester.....	204,840	1,194,857	12,062,357	73,417,460
Lowell.....	203,773	1,094,357	13,424,433	62,046,799
Fall River.....	133,239	914,599	7,730,567	53,474,458
Cambridge.....	257,029	1,090,782	16,615,223	67,471,925
Lynn.....	140,348	644,821	6,763,698	40,721,028
Lawrence.....	114,942	474,071	8,139,532	30,476,223
Springfield.....	141,422	576,730	8,148,255	44,493,633
New Bedford.....	213,049	622,413	12,961,338	36,869,754
Somerville.....	..	477,704	..	32,557,500
Holyoke.....	..	369,127	..	22,073,825
Salem.....	141,436	461,871	9,052,803	26,178,190
Chelsea.....	110,013	373,816	5,271,943	20,798,339
Haverhill.....	..	318,769	..	17,877,772
Brockton.....	..	281,780	..	17,477,847
Taunton.....	94,158	327,061	5,039,925	17,823,032
Gloucester.....	..	229,100	..	13,945,439
Newton.....	..	541,082	..	36,159,025
Malden.....	..	273,312	..	17,257,475
Fitchburg.....	..	266,869	..	15,476,206
Waltham.....	..	223,467	..	15,210,714
Pittsfield.....	..	159,963	..	10,292,696
Quincy.....	..	195,295	..	13,677,410
Northampton.....	..	149,485	..	9,194,091
Chicopee.....	..	85,889	..	6,377,070
Newburyport.....	86,105	150,356	4,701,911	9,646,770
Marlborough.....	..	109,487	..	6,284,638
Woburn.....	..	154,723	..	8,918,306
Totals (cities).....	\$6,119,007	\$22,949,478	\$372,870,504	\$1,548,239,425
The State (except cities)	4,581,841	8,554,188	258,875,930	905,895,201

* Currency values reduced to gold basis.

The cities in 1865 had 59.02 per cent of the total valuation, and paid 57.18 per cent of the total amount raised by taxation for all purposes. Now they have 71.87 per cent of the total valuation, and pay 72.85 per cent of the money raised

by taxation. The increase in valuation of property in cities in 1890 over that in cities in 1865 was from \$372,870,504 to \$1,548,239,425, or a gain of slightly more than 315 per cent; while the gain in valuation of property in towns is but about 134 per cent.

The cities may be grouped in classes according to the nature of their industries, and for the purpose of comparing the increase of city population and city valuation in 1890 as compared with 1865 the tables on the following page are of interest. As previously noted, the fact that a municipality was not a city in 1865 is indicated by the absence of figures in the columns for that year. All values are in gold.

Summarizing the results of these tables, it may be said that the population in cities existing in 1890 exhibits an increase over the population in cities existing in 1865, in the textile group, of 234+ per cent; in the boot and shoe group, 498+ per cent; in the leather group, 109+ per cent; in cities of diversified industries, chiefly metal working and machinery, 227+ per cent; and in cities classed as residential, 308+ per cent. The increase in valuation returned from cities existing in 1890 over that returned from cities existing in 1865, in each class, is, in textiles, 422+ per cent; in boots and shoes, 1,117+ per cent; in leather, 287+ per cent; in diversified industries, 612+ per cent; and in the residential cities, 677+ per cent.

Boston, as the chief commercial city, owing its growth to the fact that it is the metropolis of New England, and Gloucester, which is principally interested in fisheries, are omitted in the above classification. Indeed, the classification is to a certain extent arbitrary. All of the cities, including those classed as residential, have more or less extensive manufactures, and some classed under particular industry heads in these tables have other industries of importance. For instance, Holyoke, classed in the textile group, is the seat of paper manufacturing. Nevertheless, broadly speaking, the classification locates the cities in the classes representing that to which their growth is mainly due.

CITIES OF THE TEXTILE INDUSTRY.

CITIES.	Population of Cities existing in —		Valuation of Cities existing in —		Percentages of Increase in 1890 as compared with 1865.	
	1865	1890	1865	1890	In Population.	In Valuation.
Lowell.....	30,900	77,606	\$13,424,433	\$62,046,799	150+	362+
Fall River.....	17,481	74,398	7,730,567	52,474,458	325+	578+
Lawrence.....	21,698	44,654	8,139,532	30,476,223	105+	274+
Holyoke.....	.....	35,637	.....	22,073,825	.....	.....
Pittsfield.....	.....	17,281	.....	10,292,896	.....	.....
Chicopee.....	.....	14,050	.....	6,377,070	.....	.....
New Bedford....	20,853	40,733	12,951,338	36,869,754	95+	184+
Totals.....	91,022	304,449	\$42,245,870	\$220,610,825	234+	422+

CITIES OF THE BOOT AND SHOE INDUSTRY.

Lynn.....	20,747	55,727	\$6,763,698	\$40,721,028	168+	502+
Haverhill.....	.....	27,412	.....	17,877,772	.....	.....
Brockton.....	.....	27,294	.....	17,477,847	.....	.....
Marlborough....	.....	13,805	.....	6,284,638	.....	.....
Totals.....	20,747	124,238	\$6,763,698	\$82,361,285	498+	1,117+

CITIES OF THE LEATHER INDUSTRY.

Salem.....	21,189	30,801	\$9,052,803	\$26,178,190	45+	189+
Woburn.....	.....	13,499	.....	8,918,306	.....	.....
Totals.....	21,189	44,300	\$9,052,803	\$35,096,496	109+	287+

CITIES OF DIVERSIFIED INDUSTRIES.

Worcester.....	30,055	84,655	\$12,062,357	\$73,417,460	181+	508+
Taunton.....	16,005	25,448	5,039,925	17,823,032	59+	253+
Fitchburg.....	.....	22,037	.....	15,476,206	.....	.....
Waltham.....	.....	18,707	.....	15,210,714	.....	.....
Totals.....	46,060	150,847	\$17,102,282	\$121,927,412	227+	612+

RESIDENTIAL CITIES.

Cambridge.....	29,112	70,028	\$16,615,223	\$67,471,925	140+	306+
Chelsea.....	14,403	27,909	5,271,943	20,798,339	93+	294+
Somerville.....	.....	40,152	.....	32,557,500	.....	.....
Newton.....	.....	24,379	.....	36,159,025	.....	.....
Malden.....	.....	23,031	.....	17,257,475	.....	.....
Quincy.....	.....	16,723	.....	13,677,410	.....	.....
Northampton....	.....	14,490	.....	9,194,091	.....	.....
Newburyport....	12,976	13,947	4,701,911	9,646,770	7+	105+
Totals.....	56,491	230,659	\$26,589,077	\$206,762,535	308+	677+

The cities now have nearly 62 per cent of the population, nearly 72 per cent of the taxable property, and in them is invested nearly 67 per cent of the industrial capital of the State. This implies that the interests of the cities are no longer quite identical with the interests of the towns.

I have shown that the effect of immigration, both directly on account of the presence of the foreign born and also indirectly through the native born of foreign parentage, is much greater in the cities than in the towns. The foreign born have entered citizenship. A comparison as to the increase or decrease in 1885 as compared with 1875, in the proportion of foreign born voters in each municipality now having a city government, shows that seven cities out of the total number show a slight decrease. These are Holyoke, Newton, Pittsfield, Somerville, Springfield, Waltham, and Worcester. All others show an increase. Bearing in mind that the percentage of foreign born voters of total voters for the State is 22.31, it will be understood how great is the concentration of foreign born voters in cities. Fall River, for example, has 49.95 per cent of its total voters foreign born,—about one-half; Boston about one-third. In this respect each city has but slightly changed since 1875. The leading textile cities—Fall River, with 49.95 per cent of its voters foreign born; Holyoke, with 40.76 per cent; Lawrence, with 45.12 per cent; Lowell, with 33.47 per cent—and the city of Woburn, with its extensive leather industry, 39.72 per cent, out rank all others in this comparison. Brockton, Lynn, and Haverhill, leading boot and shoe cities, have a relatively small proportion of foreign-born voters, the percentages being, respectively, 18.80, 16.91, and 12.80; in each case considerably below the percentage for the State.

These comparisons indicate that public opinion in Massachusetts will in the future be largely controlled by the cities, and also that it will be different from what it has been in the past. I do not say it will be less effective upon moral questions, I only point out that it is likely to express some-

what different views from those which have sometimes prevailed respecting matters of public interest.

Of course the social problems are complicated by the rapid increase of our cities. In fact, in Massachusetts they make our social problems. There are two extremes that are opposed to civilization,—life in the city slums and life in the backwoods. Both these extremes we seem likely to touch. They are not equally dangerous, but they are equally undesirable. Between them lies that most attractive form of modern life, that which is possible under the best conditions near the city but not in it. Probably nowhere in this country is a better example of that life than is found in the environs of Boston, within a circle extending 12 miles from the State House. The cities and towns within this circle had in 1885 a population of 731,746, or 37.68 per cent of the entire population. The present population is 872,482, or nearly 39 per cent of the population of the State. The rate of increase in these cities and towns is somewhat greater than the rate of increase for the State. The proposition has recently been advanced to unite all these suburban cities and towns to the City of Boston. Whether this is done or not, one may hope that the type of life represented in these municipalities may continue.

There is no immediate danger of overcrowding in Massachusetts cities, and such instances of overcrowding as may undoubtedly be found in some quarters of Boston, and in some of our manufacturing towns, need not exist. Upon the outskirts of each city is a suburban district which may be easily connected with the business sections, so that increasing population within city limits need not here mean, as it has meant in so many European cities, crowded tenements with their inevitable evils.

Among the agencies which will do much to counteract the dangers attending the growth of cities are:—

1. Such a modification of our tax system as shall prevent so far as possible the holding of unoccupied land for specu-

lative purposes, and shall foster rather than retard the ownership of homes.

2. The further development of co-operative banks or building associations.

3. The extension of systems of rapid transit, and the further introduction of electricity as a motive power.

4. The enforcement of existing laws, and such further legislation as may be necessary, respecting the sanitary inspection and control of tenements.

5. The general advancement of the wage-earning classes.

Each of these agencies seems likely to operate in Massachusetts.

RATE OF NATURAL INCREASE OF POPULATION IN UNITED STATES.

BY HERMAN HOLLERITH, PH.D.

Many criticisms of the accuracy of the enumeration of the Eleventh Census have appeared during the past month, based upon the fact that this enumeration, when compared with those of 1860 and of 1880, would indicate a very marked falling off in our rate of natural increase. Because the decennial rate of natural increase fell from an average of 18.5 per cent for the two decades 1860 to 1880 to 14.4 per cent, the rate for the decade 1880 to 1890, these critics argue that the enumeration of 1890 must be defective.

Aside from any consideration touching the accuracy of the recent enumeration of our population, this question of decline in our rate of natural increase is an important and interesting one, and far reaching in its effect, and it may therefore be worth while to call attention to some facts bearing upon it. In the first place, let us understand the meaning of "natural increase" as used in this connection. This expression is intended to define the increase of our population due to the excess of births over deaths, irrespective of the effects of immigration. The rate of natural increase can therefore be defined as the excess of the birth rate over the death rate.

Let us first examine a few of the causes affecting the death rate. The most important factor bearing upon this rate is the age distribution of our living population due to the great variation in the death rate at different age periods. The question therefore first to be considered is, has there been any great change in the age distribution of the population of the United States during the past half century? To answer this we need but call attention to the following table:—

Year.	Per Cent of Total Population over 40 Years of Age.
1850	16.94
1860	17.81
1870	19.97
1880	20.93

In other words, while in 1850 only 17 per cent of our total population was over forty years of age, in 1880 we find twenty-one per cent of the aggregate population above that age. To discuss the effect in detail of this upon our death rate, and consequently upon the rate of natural increase, would be beyond the limits of the present article. It needs but a moment's consideration, however, to see that, other things being equal, the effect of this would be to increase to a very material extent the death rate, for we know that after forty years of age the death rate increases very rapidly. On the other hand, the excess of this aged and sterile class would, of course, reduce the birth rate. The net effect thus being to reduce the rate of natural increase, first by increasing the death rate, and further by decreasing the birth rate.

While the effects of changes in the death rate might be considerable, they would not be likely to effect the rate of increase so much, or so directly, as changes in the birth rate. The death rate is subject to but slight causes of variations outside of the influence of age distribution, and may be considered beyond human control. The birth rate, however, is largely dependent upon conditions entirely within the control of the population itself. The age at marriage and the proportion of married women within certain age limits control almost directly the birth rate, and are entirely within the control of the population. Dr. Farr, for example, has shown that the rate of natural increase in England could be doubled by simply transferring a part of the unmarried women to the ranks of the married. This is cited to show the possible extent of the influence of these factors on the rate of natural increase.

Let us now consider for a moment such fragmentary and unsatisfactory data as we have, throwing light on the birth rate in this country during the past fifty years. And here it is difficult to refrain from calling attention to the fact that, were the different papers and writers, now so freely questioning the accuracy of the last enumeration, because there has been a falling off of the rate of natural increase, to utilize their energy in the direction of establishing in this country some thorough and complete system for the registration of births, deaths, and marriages, and securing some comprehensive tabulation of the yearly immigration by age and sex, they would do a service tenfold more valuable to the country at large. However, had we such data at hand there would be no need to reply to the criticisms upon the Eleventh Census other than to refer to such statistics.

Since 1850 we have the population at each census compiled with reference to age, and we thus know at each of said censuses how many persons there were under ten years of age. This number represents the survivors at each census of those born in this country during the preceding decade (immigration at this age period being relatively insignificant), and this number would therefore be in proportion to the number of births during the preceding decade. If now we compare the number of children under ten years of age at each census with the aggregate population of the preceding census, we obtain a ratio proportional to the average birth rate during the given decade. We thus have the following table:—

Year.	Aggregate Population in Thousands.	Year.	Children under 10 Years, Thousands.	Number of Children to each 100 Popul.
1840	17,069	1850	6,739	39.5
1850	23,192	1860	9,014	38.9
1860	31,443	1870	10,329 ^a	32.8 ^b
1870	38,558 ^a	1880	13,394	34.7 ^c

We know that the figures *a a* are too low, due to the defect of the enumeration of the census of 1870, and that therefore

the figure *b* is too low and *c* is too high. It would probably not be far from correct if we assume 33.7 as the average from 1860 to 1880. These figures can be explained only by the assumption of a very rapid falling off in the birth rate from 1840 to 1880, and it will be found when the age tables are compiled for the census of 1890 that the figure for the decade from 1880 to 1890 will not be much, if any, over 30.

It has been claimed that the "most serious reason" for questioning the accuracy of the Eleventh Census is the fact that this census shows that the decennial rate of natural increase, or more properly the increase of the population excluding immigrants, has fallen from 18.5 per cent, the average of the two decades 1860 to 1880, to 14.4 for the decade 1880 to 1890.

It is obvious that these critics overlook the fact that this rate has been gradually falling, as shown in the following table:—

Decade.	Per Cent of Increase, Excluding Immigrants.
1820-1830	32.1
1830-1840	28.0
1840-1850	25.8
1850-1860	24.4
1860-1870 }	Average, 18.5
1870-1880 }	
1880-1890	14.4

There certainly is no more reason to question the Eleventh Census because this rate fell from 18.5 to 14.4 than there is to question the Tenth Census because this rate fell from 24.4 to 18.5.

Let us, however, compare these rates, which indicate approximately our rates of natural increase, with the figures which we have, indicating approximately the birth rate. Naturally, the difference between these two rates would indicate a rate proportional to the death rate. It must of course be understood that these figures do not indicate the actual

birth and death rates, but merely that they are proportional to such rates. Here is the table:—

Decade.	Rate of Natural Increase.	Birth Rate.	Death Rate.
1840-1850	25.8	39.5	13.7
1850-1860	24.4	38.9	14.5
1860-1870 }	Average, 18.5	33.7	15.2
1870-1880 }			
1880-1890	14.4	30.2	15.8

We notice in the first place that the death rate, or rather the difference between what we call the rate of natural increase and what we call the birth rate, has gradually increased, and it is but natural that the forces acting to produce this result should have continued, though perhaps not to so great an extent, during the past decade. It is therefore not unnatural to expect that this difference will reach during the past decade 15.8, which if added to 14.4, the rate of natural increase, would give us 30.2 as the figure corresponding to what we have called the approximate birth rate. Inserting these figures in the table (and it will be found when the age tables are compiled for the Eleventh Census that they are nearly correct), and examining the table as a whole, nothing can be found in it either startling or remarkable. It would indeed be strange were the table to look otherwise than it does.

One editor has actually criticised the Superintendent of the Census for not discussing this most natural falling off in the rate of natural increase. Perhaps the editor in question would desire the Superintendent of the Census to enter into a discussion of the many reasons for the constant decrease in the birth rate during the past fifty years. The data bearing on this question are so meagre, and the causes which have worked to produce this effect so many and so varied, that even a Superintendent of Census, diversified as are the requirements of his duties, can hardly be expected to enter

upon a discussion of them. Let us, however, briefly consider a few of these causes.

As before stated, the most important factor bearing upon the birth rate is the age at which marriage is contracted. While data bearing upon this subject in this country are scarce, still such data as are available show clearly that the average age at which marriage is contracted is constantly advancing. In Massachusetts, for example, the average age of women marrying for the first time has increased during fifteen years from 23.4, in 1872, to 24.4, in 1887.

Again, the proportion of married women and the ages of such married women should be taken into account. Here again, unfortunately, we have no complete data; but if we refer to the Massachusetts Registration Report, we find in the first place that there was a sudden drop in the marriage rate about the year 1858, and that this rate remained abnormally low until about 1864. It then increased rapidly, reaching a maximum of 22.15 in 1866, and remained high until 1873, when it suddenly dropped and has remained comparatively low ever since.

While, of course, it is dangerous to draw any conclusions from so small a fraction of the population of the United States,—about one-thirtieth,—still it is believed that these figures represent the general characteristics of the fluctuations of the marriage rate for the entire country.

It has been found in Sweden that the difference between the mean age at marriage and the mean age of mothers is about six years. The difference in this country cannot be far from this, and it is therefore safe to assume that the births of any given year should be compared with the marriages six years previous, so that the births during the decade from 1880 to 1890 should be compared with the marriages during the decade 1874 to 1884, and likewise for the births during the decade 1870 to 1880 we should refer to the marriages from 1864 to 1874. We thus have this table:—

Decade.	Average Persons Married to 1000 Living.
1855-64	19.25
1865-74	20.79
1875-84	17.14

Dr. Farr, in discussing the causes of fluctuations in marriage rates, says: "It is a fair deduction from the facts that the marriage returns in England point out periods of prosperity little less distinctly than the funds measure the hopes and fears of the money market. If one is the barometer of credit the other is the barometer of prosperity." It is believed that the causes operating to affect these fluctuations in the marriage rate of Massachusetts were not local, but acted throughout the United States. We can see clearly in this table of marriage rates of Massachusetts the effect of the reaction following the close of the war, and even more marked the effect of the panic of 1873.

To explain fully the falling off in the rate of natural increase we need hardly assume more than that these fluctuations in the marriage rates were general throughout the country, and that the average fecundity of a marriage has not increased. There are, in fact, many reasons to believe that it has diminished appreciably.

In considering the question of our natural increase, one is confronted at almost every turn by a lack of sufficient data for any positive deduction. We have already referred to the absence of reliable statistics relating to births, deaths, and marriages, and the proper tabulation of data relating to immigrants coming into this country. It is painful to anyone interested in American statistics to contrast our entire lack of data relating to these subjects with their thorough registration and compilation by every other civilized country.

In regard to the compilation of data obtained by the Census Office itself, it is believed that the Eleventh Census of the United States will far surpass any previous census in

this or any other country. In the first place, we have on the schedule of population itself the additional inquiries as to the number of children born and living, and the number of years that foreign-born persons have resided in this country. We also have, as at the Tenth Census, the inquiry relating to conjugal condition and whether married during the census year. These latter inquiries unfortunately were never compiled for the Tenth Census, and hence we shall probably be unable to make any comparisons when this information is compiled for the Eleventh Census. If the answers to these inquiries are compiled in connection with sex, race, age, and nativity, and a further distinction is drawn between the native born of native parentage and the native born of foreign parentage, as it is believed will be done by this census, we will have a mass of information such as has never been obtained in this country, and such as will increase in value at each subsequent census for purposes of comparison. With such data from previous censuses the reasonableness or unreasonableness of the rate of natural increase can readily be demonstrated.

THE FIRST CENSUS OF MASSACHUSETTS.

BY THE HON. SAMUEL A. GREEN, M.D.

LIBRARIAN MASSACHUSETTS HISTORICAL SOCIETY.

The earliest census of Massachusetts was taken during the Provincial period under great difficulties. Before that time, it is true, on various occasions, there had been collected certain statistics which embraced the number of families or of polls, or other minor inquiries, but there had not been previously a general enumeration of all the inhabitants.

On June 2, 1763, Governor Francis Bernard sent a message to the General Court, expressing his wish that a census of the Province might be taken; but that body paid no heed to the suggestion. It was under his administration that an attempt to enforce the Writs of Assistance had previously been made, and this rendered him unpopular among the sturdy yeomanry with whom he had no sympathy. On January 19, 1764, the Governor renewed the proposition, apparently with better success, for the Legislature, on February 2, adopted an order carrying out his wishes. The popular heart, however, was not in the work, and no public interest was felt in the measure. The people were suspicious of the rulers in England, and jealous of all political interference, and naturally the census proceeded slowly. On March 5, 1765, an Act was passed by the General Court to carry into effect an order which had already been passed for numbering the people within the Province. This supplementary action shows that the Governor's pet scheme was not receiving a warm support.

With these drawbacks, and under such conditions, the first official registration of the number of people in the Province of Massachusetts Bay ever made was finished in the year 1765. It included as well the number of families, the number of boys and girls under sixteen years of age, the number

of men and of women, and also of negroes. Singularly enough, there are now no traces or returns of this enumeration among the State archives, where they were undoubtedly placed. How or when they disappeared is a matter of conjecture, but probably they were lost amid the confusion that naturally and necessarily prevailed during the revolution. Fortunately, a copy of this census was found by the late Judge Samuel Dana, of Groton, among some papers of a deceased friend, which had then lately come into his possession; and by him sent to the *Columbian Centinel* (Boston), where it was printed for the first time in the issue of August 17, 1822, more than half a century after the enumeration was made. From this source is derived all the information we have concerning the figures of that early census; and the printed copy, in the absence of any other, is an authority second in importance only to the original manuscript returns.

In his letter to the editor of the *Centinel*, Judge Dana suggests that the copy — presumably the original document — after it was printed should be sent to the Antiquarian Society for preservation in its library. If he meant by this name the American Antiquarian Society at Worcester, it appears not to have been done. Some years ago, at my request, a careful search for the missing manuscript was made by the librarian, but without success; and no record of the document is now found among the accessions of that period. After it had been used as “copy” by the printers, it probably was thrown away.

In the early days of library management, loose manuscripts and other papers were not guarded with that care which they now receive, and consequently were more liable to be lost. I mention this fact because once these census returns were probably in the possession of the Massachusetts Historical Society. Among some gifts made to the Historical Library by the Reverend Dr. James Freeman, on April 9, 1791, is a “List of Inhabitants in the Province of Massachusetts Bay, in 1764 and 1765” (*Proceedings*, I. 8), which does not appear

in the Society's catalogue published in the year 1811, nor is there now any clew to it. The catalogue of 1796 does not give the separate manuscripts, so that it affords no help in the matter. Perhaps this list was taken out from the library by a member at some time between the years 1791 and 1811, and was not returned. Subsequently, it may have drifted into Judge Dana's hands, and thus found its way to the public through the columns of the *Centinel*.

Akin to this subject, there is now in the Historical Society's library a memorandum-book of forty-five pages which contains some interesting facts connected directly or indirectly with the population of the Commonwealth during the revolutionary period. Mr. Felt, a former librarian, evidently used it in preparing an article on the population of Massachusetts, published in the first volume of the "Collections of the American Statistical Association" (Boston, 1847). In his paper Mr. Felt gives nearly all the statistics found in the memorandum-book, and speaks of it as "a manuscript of credible authority" (page 157), though without mentioning it more specifically. The number of white persons within the State in the year 1776, and the number of polls in 1778 and 1781, as well as other statistical facts, are also given, though it is not known by whom the record was made. It furnishes a few items of some value for comparison with later enumerations.

In compliance with a resolution of Congress, an Act was passed by the General Court, on July 2, 1784, requiring the assessors of towns, districts, and plantations to make certain returns, such as the quantity of land within their respective limits, and the number of buildings thereon, distinguishing dwelling-houses from other buildings, and the number of inhabitants of all ages and sexes, distinguishing white from black. These returns were to be made before the first day of the ensuing November. While they are meagre by the side of those of more modern times, they are of interest in connection with subsequent returns.

The first enumeration of the Commonwealth, under a national census, was taken in 1790, and even then the statistical returns were scanty. A comparison of this census with the one of last year shows many marked changes in the relative position of towns in their size and importance. Take certain places in Middlesex County, for instance, and compare them in their population with the same places of today; and the result is suggestive. At that time Cambridge was the largest town in the county, and Groton came next. Cambridge had 355 families, numbering 2115 persons; and Groton had 322 families, numbering 1840 persons. Charlestown had a population of 1583, and Newton 1360. Reading, with 341 families (19 more than Groton), numbered 1802 persons (38 less than Groton). Woburn then had a population of 1727, Framingham 1598, Marlborough 1554, and Waltham 882. Pepperell contained 1132 inhabitants, Shirley 677, Westford 1229, and Littleton 854. There were at that time in the county 41 towns, which number has since been increased to 46 towns and 8 cities; and in the meanwhile Brighton and Charlestown have been merged in the municipality of Boston, and thus have lost their separate existence. The county today contains more cities than any other within the limits of the Commonwealth. They are eight in number, and, according to their municipal seniority, as follows: Lowell, Cambridge, Somerville, Newton, Malden, Waltham, Woburn, and Marlborough. Essex County comes next with six cities, as follows: Salem, Lynn, Newburyport, Lawrence, Haverhill, and Gloucester.

THE COMMERCIAL DEATH RATE.

BY ALBERT C. STEVENS.

The field for investigation of social statistics opened by *Bradstreet's* when it defined anew a "business failure," taken in connection with that journal's record and classification of the causes of failures and its determination of the approximate total business population of the United States, promises important and hitherto unsuspected results. At this time the development of the inquiry has made comparatively little progress, but actual and prospective discoveries have been grouped which will claim attention from all students of social problems.

The purpose of this paper is to furnish a brief record of the work of determining the real as well as the nominal commercial mortality rate and, incidentally, to indicate the direction which future investigations are likely to take, together with the nature of results foreshadowed.

The business population of the United States, for the purpose of this inquiry, consists of the total number of individuals, firms, and corporations reported by The Bradstreet Company, as having a distinctive position in the commercial, industrial, and financial world. Of these there were 989,420 at the end of the calendar year 1890. The business population compared with the total actual population of the country is therefore very small, only about 1.6 per cent; ten years ago it amounted to only 1.4 per cent. But as business operations are conducted almost exclusively (in an executive sense) by (male) adults, manifestly a different comparison should be made. At the date of the Tenth Census the number of male adults reported having business occupations was, in round numbers, 12,000,000, but the business population amounted to 703,000, or only 5.8 per cent of that number. Ten years later, estimating the total number of (male)

adults in 1879-80 at approximately 15,000,000, the proportion forming the so-called business population of the country was 6.5 per cent.

It is worth while at this point to examine the records of the Tenth Census as to the number employed in gainful occupations in 1879-80, in order to ascertain clearly what classes of occupations appear to be assigned a place in the business population. Among the general divisions of occupations made by the census in 1880, the following approximate totals were included in what was regarded as the total business population at that time:—

	Totals, included in "business population."	Number of (male) adults in each division.
1. AGRICULTURAL		5,500,000
Dairymen, Florists, Nurserymen, Stock- raisers, etc.,	27,000	
2. PROFESSIONAL AND PERSONAL SERVICES .		2,200,000
Livery Stable, Hotel, and Restaurant Keepers,	47,000	
3. TRADE AND (4) MANUFACTURING . . .		4,800,000
Agents, Newspaper Dealers, Packers and Shippers, Liquor Dealers, Banks, Bank- ers and Brokers, Traders and Dealers, and Manufacturing Concerns, . . .	590,000	
In addition, Miscellaneous and Individual, .	64,000	
Totals 1879-80,	728,000	12,000,000

In the foregoing classification no account is taken of the vast (male) adult farming population, of employees in any line of business, of savings banks, insurance companies, of transportation interests, or of any purely speculative business enterprises. This classification, in connection with annual totals of mercantile failures, has been preserved for twelve years, and forms the field in which the study of statistics of commercial mortality has been undertaken; it is, as has been seen, a little plot, including not quite one million individuals, firms, and corporations in 1890, out of probably 15,000,000 adults engaged in gainful occupations of any kind in that year.

The business population of the United States each year, from 1879 to 1890 inclusive, with the total number of individuals, firms, and corporations discontinuing business for any cause during those years, the net increase per annum of commercial, industrial, and financial "births," and totals of business failures reported, with percentages of the same to the total business population, are for the first time brought together in one exhibit as follows:—

Calendar Year.	*Total Business Population in United States.	*Total Number Dropping out Each Year.	*Net Total Number Added Each Year.	Number Reported Failing Each Year.	Per Cent Reported Failing to Total Business Population.
1879	703,000	100,000	.....	6,652	.94 of 1 p. c.
1880	783,000	110,000	30,000	4,350	.60 " "
1881	780,000	110,000	47,000	5,929	.76 " "
1882	820,000	105,000	40,000	7,635	.93 " "
1883	855,300	110,000	35,000	10,299	1.20 " "
1884	875,000	120,000	20,000	11,620	1.32 " "
1885	890,000	145,000	15,000	11,116	1.25 " "
1886	920,000	165,000	30,000	10,568	1.15 " "
1887	933,000	170,000	13,000	9,740	1.04 " "
1888	955,000	178,000	22,000	10,587	1.10 " "
1889	978,000	206,000	23,000	11,719	1.20 " "
1890	989,000	229,000	11,000	10,673	1.07 " "

*Estimated in part.

The determination of what constitutes the business population of the country was first undertaken by officials of the Tenth Census, with the co-operation of the Bradstreet Company. Of the importance of the inquiry the census report said:

"Another body of data of great value in making this investigation consisted of the returns of the property invested in all branches of business, manufactures, trade, and banking as collected by one of the great mercantile agencies of the country, viz., that of the Bradstreet Company, which kindly consented to allow the census office to compile this matter from the reports made to them by their agents, on the sole condition that the names of the individuals and business houses concerned should not be made public. . . . Such

material, when used discriminatingly and carefully, not as being ultimate authority, but as data to be sifted and compared with data derived from independent sources, may become of great value in a statistical investigation like this. When it is considered that nearly a million corporations, firms, or individuals doing business were enumerated in this collection, which embraced every kind of business in which credit is asked or received, whereas the census law makes no provision for obtaining the capital invested in trade or banking, and obtains whatever it does get regarding the capital invested in manufactures at a great disadvantage on account of the reluctance of individual proprietors to disclose the facts of their business, it will appear that such a body of material might be made of much service in dealing with the question before us (the aggregate sum of wealth of the United States on June 1, 1880)."

From the tabular exhibit in the foregoing it appears that from 1880 to 1890 the increase in the business population was 40 per cent, as compared with an officially reported increase of 24 per cent in the total population of the country. The total number reported failing each year has nearly doubled within the decade, but the practical uniformity of the number who fail each year, in proportion to the total business population, is striking, and reminds one of the remarkable results obtained by statisticians as to conditions under which the total number of marriages, suicides, deaths, births, and other social phenomena take place with greater or less frequency. Comparatively heavy additions to the number reported in business in the earlier portion of the past decade are due to the extraordinary expansion of exports, and to the "boom" in business in all lines incident to the years 1879, 1880, 1881, 1882, and to some extent in 1883. For like reasons the number dropped annually from totals of business population from 1879 to 1883 was relatively small. At the close of 1883, a check to the extension of credits had hardly attracted general attention when early in the year

following (May, 1884) came the panic which brought with it a year and a half of trade depression and required another year of recuperation before another twelve-month of general commercial and industrial activity was experienced—in 1887. Business was relatively quiet in 1888 and 1889, traders manifesting a disposition to await developments. In 1890 trade was much more active, and, notwithstanding a financial panic at New York in November of that year, the twelve months must be regarded among the more prosperous of the entire decade. This brief reference to the state of general trade for ten years past, together with the growth of the business population, will account for much of the variation in the total number of failures reported.

At this point the inquiry arises, what is a “business failure?” Heretofore the “failures” referred to have been of individuals, firms, and corporations which have not only *not* been successful, but which in each instance owed more than they could pay; in other words, failures of those *whose creditors suffered* by the failures. But there are manifestly other business failures than those in which creditors as well as principals lose money. We have seen in the foregoing that within twelve years from 100,000 to 229,000 names of individuals, firms, and corporations have been dropped annually from totals constituting the business population of the country. So, as may be inferred, it is not unlikely that in the near future the attempt may be made to record business failures in which principals alone lose money (by impairment of capital, by drafts on private resources, or by failure to make profits enough to constitute interest on investment) and pay losses and retire; in a sense they may be said to die (a commercial or industrial death) and “make no sign.”

After thus re-defining a business failure, reference to the foregoing table causes one to wonder what proportion of the 200,000 or more names of individuals, firms, and corporations dropping from the commercial and industrial ranks each year are failures. The answer to this, it is to be hoped, will be

made with some definiteness within a year or two, as the work involved is now under consideration by the institution which, by this contribution to social statistics, has shown how it has taken on in part a public character and function.

It is worth noting that those having to do with the necessary daily, weekly, monthly, and yearly weeding out of names of individuals, firms, and corporations among those included in the total business population of the country recorded by the Bradstreet Company report that 66 to 75 per cent of the total, dropping out of business and erased from the record each year, are actual *discontinuances* of business,—failures to succeed,—while the remaining 25 to 34 per cent consists of those making “changes in business,” the element of success not being absent. This is a very broad generalization, yet to those who have been reporting this class of business changes year in and year out it is not unlikely that it includes a fair approximation to the fact. It may be taken, therefore, that the average annual number of names dropped from the records of the total business population within twelve years past is 142,000. Of this total, 75 per cent, or 106,500 is suggested as the proportion failing from all causes. If 9,256, the average annual number (heretofore classed as failures), be subtracted, the remainder, or 96,244, is the indicated probable average annual number “failing” in business without loss to creditors,—yet failing to make a success. Regarding this calculation as only approximate, it is found that, whereas the percentage of the average number failing each year (with liabilities in excess of assets) is 1.06 per cent of the average total in business, the percentage of those failing without loss to creditors is 11 per cent, and the proportion of both varieties of failures, per annum, to total in business is 12.1 per cent. If the proportion of two-thirds be used, of total actual failures to number in business, it will be found that 9.7 per cent of the 874,000 in business failed without loss to creditors.

In the inquiry as to “causes of business failures,” recently made public in *Bradstreet's*, is found a novel and valuable

collection of data. The chief causes of business failures are divided into six leading classes, two of which are again divided as follows:—

CAUSES OF BUSINESS FAILURES IN THE UNITED STATES IN 1890.			
		Per cent.	
		No.	Liab.
A. Percentages of the number and liabilities of traders failing primarily through faults of their own.	I. INCOMPETENCE.	1. INCOMPETENCE (unsuitability, incapacity).....	18.8 12.3
		2. INEXPERIENCE.....	5.7 2.1
		3. LACK OF CAPITAL.....	37.9 26.1
		4. UNWISE GRANTING OF CREDITS.....	4.7 4.2
	II. NEGLIGENCE OF BUSINESS.	1. SPECULATION (outside regular business).....	5.6 11.2
		2. NEGLIGENCE (due to doubtful habits).....	3.6 1.4
		3. PERSONAL EXTRAVAGANCE.....	2.1 1.5
	III. FRAUDULENT DISPOSITION OF PROPERTY	3.9 3.9	
	B. Percentages of the number and liabilities of traders failing through influences primarily beyond their control.	IV. DISASTER (flood, fire, crop failure, commercial crisis	12.7 24.3
		V. FAILURES OF OTHERS (of apparently solvent debtors)	2.4 11.9
VI. SPECIAL, OR UNDUE, COMPETITION.....		2.3 1.2	

Results of the examination with reference to the United States, for the year 1890, are condensed into the following to form the basis of a new collection of social economic statistics:—

SUMMARY—BUSINESS FAILURES IN THE UNITED STATES CLASSIFIED AS TO CAUSES.

Failures due to	No.	Assets.	Liabilities.
Incompetence.....	2,005	\$10,856,524	\$21,545,326
Inexperience.....	611	1,951,933	3,562,065
Lack of capital.....	4,052	23,601,043	45,818,994
Reckless granting of credits.....	502	3,935,656	7,204,055
Failures of others.....	257	9,745,954	20,790,648
Personal extravagance.....	232	1,265,670	2,626,381
Neglect of business.....	390	1,223,198	2,411,502
Undue competition.....	246	1,235,549	2,194,551
Disaster, or commercial crisis.....	1,358	28,627,846	42,660,814
Speculation outside.....	604	8,917,424	19,616,481
Fraudulent disposition.....	416	1,604,828	6,612,060
Totals.....	10,673	\$92,775,625	\$175,032,834

The first three classes of causes of business failures, with sub-divisions, as arranged in the tabular view presented in the foregoing, refer, it is perceived, to inadequate training, wisdom, and capital possessed by those who fail. It is thus seen that more than four-fifths (82.3 per cent owing only 62.7 per cent of the total liabilities) of all who failed in business in the United States in 1890 did so, *primarily*, because of lack of equipment, either natural or acquired, mental or financial.

Failures resulting from the three remaining causes, those caused in some way by what may be termed outside influences, are seen to amount to only 17.4 per cent of the whole number,—about one-sixth,—yet their aggregated liabilities are equal to more than one-third of the whole amount, or 36.2 per cent.

The largest number of failures due primarily to any one of the foregoing causes was of those caused by lack of capital, which does not refer exclusively to traders with small capital, but includes as well those who tried to do more business than the capital available warranted. Such failures amounted to nearly 39 per cent of the whole number, but their total liabilities were only 26.1 per cent of the aggregate, indicating that by far the larger proportion of such failures (numbering 4,052) were of traders with small or inadequate capital. It has been pointed out that nearly 90 per cent (9,572) of all the failures in 1890 were of individuals, firms, or corporations with \$5,000 capital or less (*Bradstreet's*, January 24, 1891), and the inference is that the remaining 5,520 traders with that capital or less did *not* fail on account of the lack of capital, or of overtrading. The probabilities are that most of them will be found classified among the 2,616 who failed from a want of fitness for or experience in the ventures in which they were engaged, among the 1,358 who were overcome by disasters of one form or another, and to some extent among all or nearly all of the remaining classifications.

Among the seven groups in Class A only one — failures

due primarily to speculation outside of the regular business — is found to carry a disproportionately large percentage of liabilities. This indicates that concerns of larger capital and some credit predominated among failures of that group. In the groups under Class B concerns lightly capitalized undoubtedly predominated among those which failed primarily owing to undue competition, as indicated by the relatively small proportion of liabilities. But failures due to failures of debtors and to disasters (in many instances to financial stringency during the late months of 1890) were evidently made up to a noticeable extent of individuals, firms, or corporations of fair credit, or better, and with considerable capital.

The more conspicuous conclusions indicated by the foregoing are well calculated to attract attention: —

1. That only one (male) adult in every 17 in business in commercial, financial, and industrial lines is engaged as chief executive, partner, or proprietor.

2. That one in every 94, engaged in business as above, fails each year, with liabilities in excess of assets.

3. That (in all probability) one in every nine (or ten) engaged in business, as described, fails each year, but without financial loss to others.

4. Aggregating failures of both varieties, it appears that one in nearly every 8.2 have failed, on the average, each year during the past decade.

5. And, finally, judging from the preliminary inquiry into causes of business failures, it would seem that 80 per cent of the failures where liabilities exceed assets are due primarily to faults of those failing, and are, therefore, proportionately larger than they may be in the future, when causes of mercantile failures have been more fully studied.

The source of the foregoing information is the business community itself,—obtained by and given out through the Bradstreet Company, an organization engaged in recording, publishing, and defending the credit of solvent merchants and institutions throughout the world.

PARLIAMENTARY ELECTIONS IN JAPAN.

BY THEODORE M. MACNAIR, TOKYO.

On the 10th of June, 1890, the fifteen largest tax-payers¹ on land and income in each city (*fu*)² and prefecture (*ken*) in Japan chose one from their number to represent them in the House of Peers, which convened for the first time November 25th. Of the 45 men who were elected (subject to the Emperor's approval) 22 are farmers, 15 are merchants; and of the remainder two are manufacturers, one is a mine owner, and one is the president of a bank. One of the number is a nobleman, and seven represent the old *samurai* or gentleman-warrior class. It is remarkable that the percentage of *haemin*, men who less than a half century ago were denied social recognition, is as much as four-fifths of the number elected. It illustrates the change which has come to Japan with the revolution of Meiji. These men now sit in conference upon matters of state with the princes and nobles of the realm. They constitute one-seventh of the total membership of the Upper House, a body that is composed of 10 princes (exclusive of the members of the Imperial family) and 21 marquises, sitting by virtue of their titles; 15 counts, 70 viscounts, and 20 barons, elected by their respective orders, or 186 nobles in all; and in addition an equal number of Imperial nominees, 45 of them as above (by approval), and the remainder by direct appointment from any class of citizens.

The largest tax-payers on the city and prefectural list are *haemin* farmers. One pays over 11,000 yen,³ another 5,800, and two others 4,900 and 3,900. There are 22 who pay over

¹ The estimate is made on the basis of the *national* taxes. Local taxes are excluded.

² There are three city (*fu*) governments, viz., Tokyo, Kyoto, and Osaka, and 42 prefectural (*ken*) governments. A *ku* is a division of either *fu* or *ken*.

³ These figures are approximate only. One yen equals one Mexican dollar.

1,000 yen each. The lowest amount is 262 yen, and is paid by the one nobleman included in the number.

Of the 91 seats in the Upper House that are in the immediate gift of the Crown only 61 have as yet been filled; 27 of these fell to the lot of members of the lately abolished Senate, and 14 to others who had also filled various government positions. Nine seats were given to educational men, chiefly to professors in the Imperial University, three to bankers, and two to men of especial prominence in commercial circles.

In the election of nobles (term, seven years) the greater number of those chosen by their peers hold titles that are older than the present era, Meiji,⁴ 1868; that is to say, among the 15 counts 3 only are from the later creations, though there are 28 among the 70 viscounts and 11 among the 20 barons. This conservatism of the nobles is further observable in the exclusion from the lists of all but two of the members of the present cabinet, who as a whole represent the newer blood.⁵

No one connected with the Imperial household or a member of the Privy Council is allowed a seat in Parliament; nor are officials in the government service, with some exceptions,⁶ or the priests and teachers of religion, admitted.

The qualifications of *electors* to the Lower House are: in respect to age, 25 years; and of property, the payment of indirect national taxes⁷ of at least 15 yen. *Members* must be 30 years of age or over, and possess the same property qualification as electors.

The elections of commoners (term, 4 years; salary, 800 yen annually) were held on the 1st day of July. They were

⁴ Meiji, or Enlightened Peace, a chronological period, began January 25, 1868.

⁵ The total number of nobles of these three orders is 541, divided as follows: counts, 80; viscounts, 356; barons, 105. These figures were published in the statistical manual of the House Dept. in August, 1890. About two-thirds of the former and one-half of the latter, but only one-seventh of the viscounts, are new. The members elected to membership in the Diet must not exceed one-fifth of the totals given.

⁶ Viz., all those whose official duties would be in any way interfered with by membership. Auditors, police and revenue officials, and officials of justice are expressly excluded.

⁷ Direct national taxes are those on *land* (*chikuzatsen*) and *income* (*kobuzai*).

chiefly remarkable for their limitations. The extent of the franchise, indeed, is such that it is practically a misuse of terms to call the elections general. The total population of Japan is 39,382,200 (exclusive of the Hokkaido, Yezo, Okinawa, and Ogasawarajima, where local government according to the general plan has not yet been organized, and where consequently no elections were held), and of this number there were but 450,365 qualified voters, or one in every 87 (1.14 per cent).⁸ The prefectural (*ken*) percentages, however, of which this is a summary, are far from being uniform. At one extreme stands Shiga with 2.3 per cent, and in all 25 of the *ken* have percentages greater than one. Tokyo, however, has only 0.37 per cent, the lowest figure; that is to say, there are less than 6,000 voters out of a total of nearly 1,600,000 inhabitants! Only two other provinces, Nagasaki and Kagoshima, have less than 0.5 per cent. The very low average for Tokyo is accounted for by the comparatively small number there of large land-owners, and by the wide distribution of wealth, excepting a few massive lumps, which is bound up in commerce. There are thousands of well-to-do merchants who do not yet pay 15 yen in direct national taxes.

In evidence of the general interest taken in the elections by those who qualified as voters, only 27,636, or about 6 per cent (6.1), failed to appear at the polls. The percentages for the several *fu* and *ken* vary as widely as from 1 to 11, and on a comparison of *ku* (sub-election districts) an even greater divergence appears. In the second *ku* of Fukuoka *ken*, for example, of 3,984 registered electors only one did not vote, and in two other *ku* (3rd and 4th), containing 8,104 and 1,150 electors respectively, every ballot was cast. In one of the Tokyo districts, on the other hand, the non-voting electors were over 80 per cent (80.5) of the registered list. In Naga-

⁸ The appended tables of statistics, A and B, which include these figures, were compiled by K. Suyematsu, M. P., from materials provided by the Dept. of State (Naimusho), and by various *fu* and *ken* offices. Mr. Suyematsu was connected with the Bureau of Prefectures before his election, and therefore able to secure reliable information. I am further indebted to him for comments on the elections, contained in a recent address delivered by him in Tokyo.

saki the 6th *ku* shows 30.9 per cent, the highest figure. It has therefore happened in Japan, as elsewhere, that the interest roused by the elections was less in the large cities than throughout the country districts,—an illustration of the yielding of political opportunity to personal and business cares. But there exists a further explanation of the discrepancy. It is a law of elections that voters shall affix their names and seals to their votes, in order to secure the purity of the ballot. This in effect registers the elector's choice, and the more numerous obstructions in the cities, where the number of candidates was greatest and electioneering excitement ran high, were therefore natural. Men preferred not to vote at all, so as to avoid giving offence, the fear of which need not have been entertained had the ballot been wholly secret. It may be also said that this registering of votes tends to make bribery effective while, on the contrary, secrecy, like that of the "Australian system," destroys the briber's guarantee, and hence should greatly check this sort of corruption.

A noticeable feature of the recent canvass—one that is in a way peculiar to Japan—bears closely upon this question of bribery. By means of a *sufficient consideration*, oftentimes also by intimidation, a candidate would *persuade* men to promise him their support and to record the agreement thereto, emphasizing it with the use of the personal seal. It is said that in case a man gave such a promise as this, under whatever variety of influence, the custom of holding the seal sacred almost as life itself kept him to his recorded pledge, notwithstanding the absence of any express statute against violating it.

A further criticism of the electoral system relates to the provision made for illiterate voters. Every vote must be written on blanks that are provided in the election booths, and an officer or clerk is appointed by the inspector of elections to assist such as cannot read and write. This proved a source of fraud in certain places. Each election was conducted by an inspector in the presence of from two to five wit-

nesses, chosen by himself from among the electors. There was, therefore, nothing to prevent such a choice of witnesses as should permit a manipulation of the ballot in the interests of the inspector's favorite, and the *Guncho* (district or *gun* head-man), who appointed the inspector, and even the *Kencho* (governor), who approved the appointment, might have a hand in the business. Mr. Suyematsu asserts that the ballots of illiterates were so frequently "doctored" by the clerks that much dissatisfaction arose among voters, and with it a demand for authorized police surveillance, though how this would have remedied the evil it is difficult to see. The governors kept *formally* quite clear of the elections, lest they should seem to interfere for partisan purposes. Some cities have urged the passage of a law requiring that the appointment of witnesses shall be approved by a certain number of the electors themselves.

Mr. Suyematsu, in his speech, made some interesting comparisons between election statistics in Japan and elsewhere, to enforce his conclusion that the political zeal of the Japanese is of a high order. In the general elections in France, in 1887, there were only 5 districts in which the percentage of *Kikensha* (men who possessed but did not exercise the franchise) was less than 20. In 16 districts it was between 20 and 25; in 22, between 25 and 30; in 17, between 30 and 35; and in 12, between 35 and 40. In one it was as high as 50.3, the opposite extreme being 18, and the average 31.8. In another year (1885) the figures were somewhat lower,⁹ the extremes being 13 and 39, and the average 23. Another example, taken from ancient Athenian history, shows a percentage of *Kikensha* as high as 80, only about 5,000 citizens voting out of a total of 20,000 or 25,000.¹⁰

⁹ In 3 districts the percentage was between 12 and 15.

" 28	"	"	"	"	"	15	"	20.
" 20	"	"	"	"	"	20	"	25.
" 13	"	"	"	"	"	25	"	30.
" 12	"	"	"	"	"	30	"	35.
" 2	"	"	"	"	"	35	"	40.

¹⁰ Lieber's *Political Ethics*, Vol. II, p. 231, note.

In France, in 1834, the *Yukensha* (electors) were 171,015, but only 129,211 voted, giving a percentage of Kikensha of 24.5. In 1837 the proportion was similar (one-fourth), or 151,720 Kikensha in a total of 198,836 Yukensha.¹¹

Two further examples illustrate American experience. In an election for governor in Connecticut in 1830 the number of actual voters was one-seventeenth of the population. Assuming that at least one-seventh of the people were electors, the proportion of Kikensha exceeded one-half. And when some years ago the question of amending the state constitution was before the people of Pennsylvania, and election excitement was unusually great, only one-sixth of the population voted, while as many as one-fifth were electors, *i. e.*, the percentage of Kikensha was about 15.¹²

In comparison with such figures as these the exceedingly small percentage in Japan, *viz.*, 6.1, is remarkable. Various causes contributed to producing the effect. Chief among them was the novelty of the experience and the comparatively limited number and consequent high grade of the electors, taken as a class.

The Lower House of the Diet has 300 members, each of whom represents on an average 131,278 units of the population, and 307,560 yen of the public revenue. The representation figures range from 1,480,000 in Yamanashi to 107 in Nagasaki. It was determined that one member should stand for about 120,000 people, and so the *gun* (a section of the *ken*) was taken as the most convenient standard for distribution. *Guns* generally have populations of from 100,000 to 150,000. Whenever, in the division, the number fell below 100,000, that section was merged in an adjoining one or more, and it frequently happened that two seats could be assigned to the combination. It is curious that with this method of division the country so fell apart that the number of election districts (25,743 of them obtaining two members each) met exactly the requirements of the general plan.

¹¹ Lieber. P. 231, note.

¹² *Idem.* P. 231, note.

The House of Representatives is composed of 109 *shizoku* (*samurai*) and 191 *haemin*. In view of the social status of *haemin* previous to the Revolution (1868), it is remarkable that they should approximate two-thirds of the total membership; whereas, on a comparison of their numbers as a class with the number of *shizoku* throughout Japan, the latter with less than two millions (1,976,480) should have only 14 or 15 of the 300 representatives instead of over one-third. The disproportion marks the influence of education and of the *samurai* temper. From certain sections of the country, viz., Aomori, Tottori, Saga, Miyazaki, and Kagoshima, none but *shizoku* were returned; while the members for eight districts in central Japan are all *haemin*, viz., for Saitama, Gumma, Tochigi, Nara, Shizuoka, Yamanashi, Gifu, and Fukushima.

Classified according to birth in the several periods or reigns, into which the last seventy years are divided, 10 members are more than 62 years of age; there are 59 whose ages range from 48 to 61; 40 are from 44 to 47; 99 from 38 to 43; 85 from 32 to 37; and 7 from 30 to 31.

With respect to wealth the members differ widely, as appears from the statistics of taxation. The whole amount of taxes paid by them (local taxes not included) is 37,698 yen, the average being 125.66; but the extremes are 15, as paid by a member from Okayama, and 2,260, as paid by one from Hiroshima. Other sums noted in the table are 1,600, 1,200, 1,100, 1,000. Less than nine per cent (3,205) of the whole is *income* tax. The remainder, 34,492, represents the *land* tax, thus showing the preponderant political influence of agriculturists, and reflecting somewhat the prejudices of a past when merchants as a class were despised. In case a man pays taxes outside his own election district (that in which he has resided for at least one year), he may obtain certificates of the several amounts from the proper local authorities, and be credited with them at his place of registration; but, commonly, an elector of this class paid a sufficient amount in some one place to make such aggregating unnecessary, in which case

it was usually neglected. For the most part, however, land-owners possess undivided holdings, or holdings whose parts are not so widely separated as to be included in different districts; and since, further, the land tax is more than 90 per cent of the whole amount, the table is substantially accurate as an index of the wealth of members (as estimated in groups by election districts). It appears that in some places, notably in certain parts of Tokyo, land values had so changed that the "market" prices differed greatly from those fixed by government authority previous to 1880, and registered in the district offices.¹³ Taxes are, of course, paid on the latter basis. In consequence of this many who might otherwise have qualified as voters were technically prevented from doing so.

According to statistics published in December, 1888, the number of houses in the Empire (exclusive of those in the Hokkaido, etc.) was 7,652,598. Assuming this sum to be approximately accurate for the present time, each elector of the 450,365 represents 17 houses. The number of houses divided into the total of inhabitants gives 5.1 persons to each. On multiplying this by 17, we have 87 as the average of the population represented by each elector. This agrees with the estimate otherwise arrived at. The number of males (exclusive of those in the Hokkaido, etc.) was in 1888 19,692,258, which divided by 450,365 gives 43.7 for each elector; and on excluding non-adults (males under 20), who in 1888 numbered 8,400,000, the electoral proportion is further reduced to 25. Of invalid votes (*mukōtōhyō*) there were only 2,935 or 0.7 per cent of the total votes cast. That this percentage is so small is mainly due to the presence of clerks in the election booths to assist illiterates. Different opinions prevailed, however, as to what constituted invalidity,

¹³ It was enacted in the "Land Tax Reformers Act" of 1873 that revaluations should take place every six years. This provision, however, has not been carried out. The national tax on land is 2½ per cent of the "legal value." The "legal value" was obtained by averaging the returns of land for a period of five years, and the prices for these returns in certain standard localities during that time. The resulting sum, capitalized, became in 1880 the basis of all taxation.

so that the statistics are not altogether satisfactory. For example, one set of election officers threw out votes which gave only a candidate's *family* name, while elsewhere such votes were allowed. Occasionally, blank ballots were cast, and there were cases of attempted repeating. Some illiterate voters, too, distrustful of the honesty of the clerks, took lessons in writing, and then prepared their ballots from memory, and were successful only in swelling the number of votes that were rejected because illegible.

The figures in Table B afford some startling comparisons which illustrate prevailing differences in wealth between different localities, or in the distribution of wealth. Given, for example, a community of well-to-do people all fairly prosperous, but none of them paying the required amount of national tax (15 yen), and there are no electors; while a neighboring *gun* with not half as much wealth in the aggregate, all or most of which is held by one-tenth of the residents, has its quota of electors and its member in Parliament. Such disparity is suggestive of the pocket-borough evil. The following figures are not very exceptional, as may be seen from the table. In the seventh *ku* of Kagoshima *ken* 52 electors chose one member, and in the fifth *ku* 1,288 electors chose one. In Shimane the sixth *ku* with 51 electors, and the second with 1,871, each chose one member. In Ōsaka the second *ku* and the seventh had 278 and 2,923 electors, respectively. They have equal representation. In Kyōtō there were 2,074 electors in the fifth *ku*, and they chose two members. The 2,005 in the fourth *ku* chose but one. In Tochigi 8,638 in the second elected two members, while 8,652 in the first *ku* elected but one. In Kumamoto the fourth *ku* has one member and 2,891 electors, the first *ku* two members and only 2,589 electors. But the figures for Fukushima and Wakayama are still more curious. In the former the third *ku* has 1,822 electors and returned two members to the Diet, while the fifth *ku* has 4,272 electors and but one representative. In Wakayama 970 and 2,370 elected respectively two

and one. It is easy to believe that the governor of Nagasaki *ken* was able to control the elections in the sixth *ku*, where there were only 55 electors, 17 of whom staid at home on election day.

The statistics of occupations are interesting as showing the influence which business pursuits and local politics had upon the elections. Only one in thirty of the members is classified without occupation. In fact, the greater number are credited with several. One, for example, is a lawyer, owner of a newspaper, and president of a local assembly. Another is in the directorate of a bank, is president of a manufacturing company, besides being a farmer and local assemblyman (retired). A third, when elected, was a merchant and the *soncho* (head-man) of his village. The most frequent combinations given are between agriculture and local government. Nearly one-third, or 95, of the members belong in this category, and illustrate again the farmers' social and political prominence historically. The total number of agriculturists is 128, though but 15 are tabled as "agriculturists" only. 245 are more or less occupied with business affairs (as farmers, merchants, etc.), while politics was the sole concern of 45. This number includes under-local officials, members of local assemblies, and also officers of the central government,—*kencho*, *guncho* (who are local officials but appointed from Tokyo), and others. The advantage of connection with local politics may be inferred from the fact that 178 members possessed such connection in one or another form.

Following is a summary of occupations:—

Senate (recently abolished),			4
<i>Fu</i> or <i>ken</i> or other	{	Presidents,	28
local assemblies.		Vice-Presidents,	12
		Members,	94
			134
Local officials.	{	Kencho (governors),	1
		Guncho (<i>gun</i> head-men),	87
		Others,	10
			48

Central government,— Officials in the various departments of, (including one cabinet minister, Mr. Mutsu, recently representing Japan at Washington),			17
Bankers.	{ Presidents, 11 }		17
	{ Managers, employees, . . . 6 }		
Farmers.			128
In journalism.	{ Editors, 27 }		88
	{ Owners or publishers, . . . 11 }		
Merchants.			32
Railways.	{ Presidents of, 4 }		6
	{ Others connected with, . . . 2 }		
Officers of other transfer companies connected with railways, . . .			4
Lawyers,			29
Physicians,			3
Manufacturers,			16
Mining enterprise, connected with,			2
General in the army,			1
Painter.			1

To illustrate the extent to which personal influence rather than that of party or of principles involved entered into the canvass, the number of members who were elected outside the districts¹⁴ in which they reside is 31 (one-tenth). In almost every case, however,¹⁵ it was the candidate's birth-place, and he sought the suffrages of clansmen and friends.

Political organizations are already formed, but they lack the stability born of some definite political issue, and experience in the exercise of party functions. Statistical information concerning them is therefore of no great value. The three more important groups of members, as they appear at the opening of the Diet, are the Rikken-Jiyu-to, that of the Radicals, in number 182; the Kaishin-to or Progressist, with a following of 48; and the Taisei-to or Imperialist, numbering 85. The remaining 40 are mostly "Independent." It happens, however, that in matters of political principle the several platforms show little divergence. Liberalism is a pronounced

¹⁴ I have not counted those who resided in districts *adjacent* to the districts where they were elected.

¹⁵ In 27 out of 31.

feature, and its influence may lead to an early fusion of the first two parties with certain of the "Independents" included. It is, however, wisest not to predict. There are features of Japanese political life, such as the old-time clan spirit, waning, perhaps, but still active, which render the situation uncertain. It seems safe to say that religious questions will not prove a source of political disturbance. Attempts to rouse a Buddhist sentiment in the interests of conservatism were not successful. Indeed, thirteen of the members of the Diet are Christians, and one of them has been elected president and another chairman of the most important committee. This is not a favor shown to Christianity, except as religious profession of any sort proves to be no barrier to a man's political advancement.

I have said that personality was prominent in the canvass rather than principle. There was an evident hesitancy to discuss subjects of general interest,¹⁶ such as the tax on land and the expenses of administration,—to stand, in fact, on a rational platform. Electors, also, failed to see that an important difference lay between the Parliament of the nation and the local assemblies with which they were familiar, and, accordingly, in the elections they displayed a similar spirit, viz., to vote for the man himself rather than in view of principles more than locally important which he might promise to uphold. It happened, therefore, that men having the same politics were often in ambitious competition for a seat which fell in consequence to a candidate of another party. The numbers of competing candidates was amusingly large. There were 15 in one of the districts of Tokyo, and for all twelve seats the total was 92. That the desire for election was everywhere quite keen will appear from the fact that 92 seats taken at random were contested by 313 candidates. This leads in effect to minority representation, and it is already appreciated as an evil to be overcome.

The elections were generally free from contentions arising

¹⁶ Not, of course, in the press; this statement refers to the practice of candidates.

General Division. Fu or Ken.	Number of Ku (Elec- tion Districts).	Number of Represen- tatives.	of Parliament.	
			Land and In- come.	Average Tax per Member.
			Yen.	Yen.
Tokyo (fu).....	12	12	996.03	83.00
Kyoto ".....	6	7	1,382.46	197.49
Osaka ".....	9	10	1,403.73	140.37
Kanagawa (ken)	6	7	383.90	54.84
Hyogo ".....	10	12	1,211.98	101.00
Nagasaki ".....	6	7	205.37	29.34
Niigata ".....	9	13	1,518.27	116.79
Saitama ".....	5	8	844.24	105.53
Gunma ".....	5	5	293.22	58.64
Chiba ".....	8	9	841.55	93.51
Ibaraki ".....	6	8	1,068.14	132.27
Tochigi ".....	4	5	264.52	52.90
Nara ".....	3	4	352.65	88.16
Mie ".....	6	7	1,231.75	175.96
Aichi ".....	11	11	2,152.10	195.65
Shizuoka ".....	7	8	1,787.82	223.48
Yamanashi ".....	3	3	896.32	299.44
Shiga ".....	4	5	234.15	46.83
Gifu ".....	7	7	2,866.05	409.44
Nagano ".....	7	8	366.33	45.79
Miagi ".....	5	5	921.33	184.27
Fukuohima ".....	5	7	238.61	34.00
Iwade ".....	5	5	142.25	28.45
Aomori ".....	3	4	98.67	24.67
Yamagata ".....	4	6	227.36	37.89
Akita ".....	4	5	1,644.12	328.83
Fukni ".....	4	4	766.75	191.69
Ishikawa ".....	4	6	558.17	92.03
Toyama ".....	4	5	166.84	33.37
Tottori ".....	3	3	117.07	39.02
Shimane ".....	6	6	3,434.30	572.38
Okayama ".....	7	8	399.00	49.88
Hiroshima ".....	9	10	2,588.36	258.84
Yamaguchi ".....	5	7	1,763.42	251.92
Wakayama ".....	3	5	411.76	82.35
Tokuohima ".....	5	5	682.41	136.48
Kagawa ".....	5	5	348.65	69.73
Ehime ".....	6	7	386.35	55.19
Kochi ".....	3	4	501.78	125.45
Fukuoka ".....	8	8	645.07	71.68
Oita ".....	6	6	302.15	50.36
Saga ".....	3	4	98.04	24.51
Kumamoto ".....	6	8	547.72	68.47
Miyasaki ".....	3	3	142.12	47.37
Kagoshima. ".....	7	7	273.24	39.03
	257	306	37,698.07	125.66
			Total.	General Average.

out of the distinctions of class, a fact which argues for the disappearance of feudal ties, and yet the pronounced *shizoku* representation in certain districts results, it is said,¹⁷ from a desire to regain the place and prestige lost in the Revolution.

Of the newly elected legislators 134 sat formerly in local assemblies. A considerable leaven of experience is therefore brought to this first national parliament, and it is plain, from the several sessions that have already been held, that the members are disposed to guard well their newly gotten prerogatives, and to exercise fully and unawed, by the novelty of the situation, those talents for debate which all Japanese possess. Important questions await consideration,—treaty revision, tariff autonomy, reform of the national expenditures, reduction of the taxes on land,—and the question arises, in view of the rather tremendous circumstances of the case, whether this oriental effort at self-government may not forsake beaten paths and prove as unique historically as it is in its geography.

¹⁷ By Mr. Suyematsu.

TABLE B.

General Division (Fu or Ken).	Sub-Election Districts (Ku).	Number of Electors (Yukensha).	Number of Non-Voting Electors (Kikensha).	Percentage of Kikensha amongst Yukensha.	Number of Invalid Votes Cast.	Number of Members per Ku.	General Division (Fu or Ken).	Ku.	Yukensha.	Kikensha.	Percentage of Kikensha amongst Yukensha.	Number of Invalid Votes Cast.	Number of Members per Ku.
Tokyo (Fu).	1	233	39	16.7	..	1	Hyogo (Ken).	1	437	72	16.5	1	1
	2	203	58	28.6	..	1		2	3,407	270	7.9	71	1
	3	311	95	30.5	..	1		3	1,793	59	3.3	19	1
	4	604	135	22.4	9	1		4	2,603	94	3.6	41	1
	5	281	26	9.3	..	1		5	1,819	83	4.6	25	1
	6	315	41	13.0	..	1		6	2,772	77	2.8	6	1
	7	279	66	23.7	1	1		7	2,609	140	5.4	2	1
	8	246	39	15.9	..	1		8	3,061	141	4.6	3	2
	9	182	20	11.0	..	1		9	1,579	82	5.2	6	2
	10	798	36	4.5	..	1		10	2,153	163	7.6	8	1
	11	1,666	38	2.3	..	1							
	12	597	30	5.0	..	1		22,238	1,811	5.3	182	12	
	5,715	623	10.9	10	12								
Kyoto (Fu).	1	112	36	32.1	..	1	Nagasaki (Ken).	1	427	58	13.6	..	2
	2	208	61	29.3	5	1		2	1,455	150	10.3	5	1
	3	1,703	198	11.6	22	1		3	737	84	11.4	3	1
	4	2,005	271	13.5	11	1		4	844	70	8.3	13	1
	5	2,074	146	7.0	3	2		5	145	27	18.6	..	1
	6	1,413	113	8.0	10	1		6	55	17	30.9	..	1
		7,515	825	11.0	51	7		3,663	406	11.1	21	7	
Osaka (Fu).	1	405	69	17.0	..	1	Niigata (Ken).	1	2,532	350	13.8	27	1
	2	701	158	22.5	3	1		2	2,904	150	5.2	90	2
	3	278	59	21.2	..	1		3	2,152	229	10.2	29	1
	4	2,041	125	6.1	..	2		4	1,700	239	14.1	89	1
	5	2,910	82	2.8	11	1		5	2,650	208	7.9	9	2
	6	2,849	149	5.2	4	1		6	1,204	142	11.8	4	1
	7	2,923	120	4.1	22	1		7	1,529	94	6.2	..	2
	8	1,697	33	4.9	25	1		8	2,541	172	6.8	4	2
	9	1,896	37	2.0	6	1		9	536	90	16.8	7	1
		15,700	882	5.6	71	10		17,748	1,685	9.4	269	13	
Kanagawa (Ken).	1	287	50	17.4	..	1	Saitama (Ken).	1	3,205	119	3.7	14	1
	2	2,016	227	6.3	27	1		2	3,998	80	2.0	67	2
	3	1,585	119	7.5	13	2		3	4,809	132	2.7	65	2
	4	957	43	4.5	6	1		4	5,273	118	2.2	38	2
	5	1,589	96	6.0	6	1		5	793	34	8.3	1	1
	6	2,084	70	3.4	9	1		18,078	483	2.7	185	8	
	8,521	505	5.9	61	7								

TABLE B. CONTINUED.

General Division (Fu or Ken).	Sub-Election Districts (Ku).	Number of Electors (Yukensha).	Number of Non-Voting Electors (Kikenasha).	Percentage of Kikenasha amongst Yukensha.	Number of Invalid Votes Cast.	Number of Members per Ku.
Gumma (Ken).	1	1,980	161	8.1	87	1
	2	2,377	71	3.0	..	1
	3	1,408	61	4.4	7	1
	4	1,847	51	2.8	7	1
	5	978	52	5.3	13	1
		8,580	396	4.6	64	5
Chiba (Ken).	1	2,208	144	6.5	11	1
	2	3,700	129	3.5	10	2
	3	2,863	154	5.8	49	1
	4	1,078	55	5.1	13	1
	5	1,668	164	9.8	23	1
	6	1,860	183	9.8	7	1
	7	2,130	124	5.8	5	1
	8	1,340	52	3.9	7	1
		16,647	1,005	6.0	125	9
Ibaraki (Ken).	1	2,671	89	3.3	..	2
	2	2,008	68	3.4	..	2
	3	2,854	97	3.4	4	1
	4	1,905	98	5.1	14	1
	5	3,303	144	4.4	4	1
	6	2,802	110	3.9	7	1
		15,543	606	3.9	29	8
Tochigi (Ken).	1	3,652	170	4.7	7	1
	2	3,633	179	4.9	40	2
	3	1,574	91	5.8	4	1
	4	1,627	93	5.7	7	1
		10,486	533	5.1	58	5
Nara (Ken).	1	3,118	131	4.2	21	1
	2	3,763	133	3.5	60	2
	3	440	19	4.3	..	1
		7,321	283	3.9	81	4
General Division (Fu or Ken).	Ku.	Yukensha.	Kikenasha.	Percentage of Kikenasha amongst Yukensha.	Number of Invalid Votes Cast.	Number of Members per Ku.
Mie (Ken).	1	3,303	123	3.7	6	1
	2	4,500	258	5.7	5	1
	3	2,426	78	3.2	15	1
	4	2,893	111	4.6	14	1
	5	2,096	141	6.8	12	2
	6	2,646	117	4.4	22	1
		17,337	828	4.8	74	7
Aichi (Ken).	1	509	105	2.8	..	1
	2	1,914	62	3.2	..	1
	3	2,380	59	2.4	..	1
	4	1,808	114	7.0	31	1
	5	2,292	187	8.2	2	1
	6	2,411	127	5.2	3	1
	7	1,828	186	10.2	..	1
	8	3,072	121	3.9	..	1
	9	1,289	69	5.4	..	1
	10	822	41	5.0	9	1
	11	637	39	6.0	1	1
		18,762	1,110	6.0	46	11
Shizuoka (Ken).	1	1,034	57	5.5	7	1
	2	1,022	56	5.5	3	1
	3	1,474	34	2.3	10	1
	4	2,684	87	3.2	8	1
	5	2,188	41	1.9	..	1
	6	1,536	47	3.1	18	1
	7	1,710	76	4.4	1	2
		11,648	398	3.4	47	8
Yamanashi (Ken).	1	1,968	301	15.3	5	1
	2	970	69	7.1	27	1
	3	867	44	5.1	5	1
		3,805	414	10.9	37	3

TABLE B. CONTINUED.

General Division (Fu or Ken).	Sub-Election Districts (Ku).	Number of Electors (Yukensha).	Number of Non-Voting Electors (Kikenasha).	Percentage of Kikenasha amongst Yukensha.	Number of Invalid Votes Cast.	Number of Members per Ku.
Shiga (Ken).	1	2,065	193	9.4	18	1
	2	4,355	360	8.3	20	1
	3	5,682	653	11.5	50	2
	4	3,354	261	7.8	19	1
		15,456	1,467	9.5	107	5
Gifu (Ken).	1	1,541	94	6.1	22	1
	2	1,640	88	5.4	2	1
	3	1,479	95	6.4	12	1
	4	2,064	121	5.9	14	1
	5	957	51	5.3	..	1
	6	1,793	91	5.1	83	1
	7	639	53	8.3	11	1
		10,113	593	5.9	144	7
Nagano (Ken).	1	1,746	60	3.4	8	1
	2	1,216	25	2.1	1	1
	3	1,300	67	5.2	6	1
	4	2,443	254	10.6	103	2
	5	1,416	59	5.2	4	1
	6	1,482	101	6.8	8	1
	7	1,269	57	4.5	4	1
		10,602	623	5.9	134	8
Miagi (Ken).	1	1,885	88	4.7	1	1
	2	817	41	5.0	3	1
	3	2,477	106	4.3	5	1
	4	1,870	122	6.5	..	1
	5	818	...	...	29	1
		7,867	357	4.5	38	5
Fukuoshima (Ken).	1	2,501	173	6.9	8	1
	2	2,049	81	4.0	4	1
	3	1,822	74	4.1	6	2
	4	2,488	87	3.5	50	2
	5	4,272	158	3.7	..	1
		13,132	573	4.4	68	7
General Division (Fu or Ken).	Ku.	Yukensha.	Kikenasha.	Percentage of Kikenasha amongst Yukensha.	Number of Invalid Votes Cast.	Number of Members per Ku.
Iwade (Ken).	1	1,447	83	5.7	14	1
	2	189	17	9.0	3	1
	3	1,628	108	6.6	29	1
	4	746	43	5.7	2	1
	5	657	28	4.3	2	1
		4,670	279	6.0	50	5
Aomori (Ken).	1	1,467	105	7.0	..	2
	2	2,069	211	10.0	6	1
	3	1,438	105	7.3	3	1
		4,974	421	8.4	9	4
Yamagata (Ken).	1	2,398	55	2.3	40	2
	2	2,823	81	2.9	38	1
	3	4,221	356	8.4	120	2
	4	1,495	57	3.8	5	1
		10,937	549	5.0	203	6
Akita (Ken).	1	1,286	90	7.0	2	1
	2	1,540	113	6.9	..	1
	3	2,059	163	7.9	..	1
	4	2,851	202	7.1	..	2
		7,836	568	7.2	2	5
Fukui (Ken).	1	2,135	69	3.2	16	1
	2	2,706	252	9.3	2	1
	3	2,233	115	5.2	21	1
	4	1,554	125	8.0	27	1
		8,628	551	6.4	66	4
Ishikawa (Ken).	1	2,847	100	3.5	22	2
	2	2,068	61	3.0	8	1
	3	3,459	125	3.6	6	2
	4	1,290	102	7.9	6	1
		9,664	388	4.0	42	6

TABLE B. CONTINUED.

General Division (Fu or Ken).	Sub-Election Districts (Ku).	Number of Electors (Yukensha).	Number of Non-Voting Electors (Kiken-sha).	Percentage of Kiken-sha amongst Yukensha.	Number of Invalid Votes Cast.	Number of Members per Ku.
Toyama (Ken).	1	3,373	152	3.9	30	2
	2	925	101	10.9	3	1
	3	2,827	407	17.5	23	1
	4	3,558	387	10.9	12	1
		10,683	1,047	9.8	68	5
Tottori (Ken).	1	1,208	93	7.7	8	1
	2	1,120	90	8.1	18	1
	3	1,499	83	5.7	22	1
		3,777	266	7.0	48	3
Shimane (Ken).	1	1,549	71	4.6	..	1
	2	1,871	109	5.8	3	1
	3	1,799	83	4.6	8	1
	4	829	70	8.4	8	1
	5	1,009	43	4.3	5	1
	6	51	8	15.7	1	1
		7,106	384	5.4	25	6
Okayama (Ken).	1	4,185	345	8.2	6	2
	2	1,573	68	4.3	5	1
	3	2,292	135	5.9	6	1
	4	1,893	117	6.2	5	1
	5	1,162	48	4.1	2	1
	6	1,587	99	6.2	..	1
	7	1,727	92	5.3	2	1
		14,419	904	6.3	26	8
Hiroshima (Ken).	1	993	101	10.1	..	2
	2	823	46	5.6	6	1
	3	1,456	109	7.5	53	1
	4	1,433	83	5.8	4	1
	5	1,863	117	6.3	16	1
	6	1,560	121	7.8	24	1
	7	1,564	90	5.8	6	1
	8	1,275	111	8.7	5	1
	9	1,339	84	6.3	8	1
		12,306	862	7.0	122	10
General Division (Fu or Ken).	Ku.	Yukensha.	Kiken-sha.	Percentage of Kiken-sha amongst Yukensha.	Number of Invalid Votes Cast.	Number of Members per Ku.
Yamaguchi (Ken).	1	2,983	331	11.1	5	2
	2	742	98	13.2	3	1
	3	753	82	10.9	8	1
	4	836	78	9.3	14	2
	5	442	45	9.3	10	1
		5,806	684	10.9	40	7
Wakayama (Ken).	1	2,429	137	5.6	3	2
	2	2,370	162	6.8	8	1
	3	970	114	11.8	2	2
		5,769	413	7.2	13	5
Tokushima (Ken).	1	1,471	97	6.6	3	1
	2	1,586	240	15.1	21	1
	3	1,002	64	6.4	14	1
	4	1,242	78	6.3	15	1
	5	490	45	9.2	2	1
		5,791	524	9.0	55	5
Kagawa (Ken).	1	1,325	98	7.4	20	1
	2	1,062	170	16.1	3	1
	3	1,291	58	4.5	25	1
	4	839	75	8.9	5	1
	5	1,008	65	6.0	..	1
		5,600	466	8.3	62	5
Ehime (Ken).	1	2,971	17	0.6	3	2
	2	1,341	66	4.9	8	1
	3	471	32	6.8	..	1
	4	490	56	6.3	7	1
	5	718	48	6.7	..	1
	6	814	61	7.5	2	1
		7,205	280	3.9	20	7
Kochi (Ken).	1	1,651	221	13.4	1	1
	2	2,226	72	3.2	1	2
	3	1,665	164	9.9	8	1
		5,542	457	8.2	10	4

TABLE B. CONTINUED.

General Division (Fu or Ken).	Sub-Election Districts (Ku).	Number of Electors (Yukensha).	Number of Non-Voting Electors (Kikenasha).	Percentage of Kikenasha amongst Yukensha.	Number of Invalid Votes Cast.	Number of Members per Ku.	General Division (Fu or Ken).	Ku.	Yukensha.	Kikenasha.	Percentage of Kikenasha amongst Yukensha.	Number of Invalid Votes Cast.	Number of Members per Ku.
Fukuoka (Ken).	1	2,013	105	5.2	15	1	Kumamoto (Ken).	1	2,589	217	8.4	19	2
	2	8,384	1	0.3	5	2		2	1,464	61	4.2	..	1
	3	3,104	..	..	4	1		3	3,512	184	5.2	..	2
	4	1,150	..	..	8	1		4	2,891	244	8.4	7	1
	5	8,483	5	0.2	3	1		5	1,601	164	10.2	1	1
	6	1,283	28	0.2	4	1		6	557	69	12.3	3	1
	7	1,412	9	0.6	6	1							
	8	1,402	14	1.0	3	1			12,616	939	7.4	30	8
		16,831	160	1.0	48	1	Miyagi (Ken).	1	1,327	128	9.6	16	1
Oita (Ken)	1	1,056	69	6.5	9	1		2	1,401	68	4.9	5	1
	2	647	33	5.1	8	1		3	576	78	13.5	11	1
	3	971	58	6.0	2	1			3,304	274	8.3	32	3
	4	1,069	55	5.2	13	1	Kagoshima (Ken).	1	385	72	18.7	4	1
	5	669	37	5.5	4	1		2	422	62	14.7	3	1
	6	1,538	126	8.2	2	1		3	592	46	7.8	1	1
		5,940	378	6.4	38	6		4	1,244	57	4.6	3	1
Saga (Ken).	1	5,483	559	10.2	10	2		5	1,288	70	5.4	4	1
	2	1,628	42	2.6	4	1		6	943	65	6.9	3	1
	3	2,451	147	6.0	2	1		7	52	6	11.5	..	1
									4,926	378	7.7	18	7
		9,562	748	7.8	16	4	Totals,		450,365	27,636	6.1	2,935	300

REVIEWS AND NOTICES.

REPORTS OF BUREAUS OF LABOR STATISTICS.

Fifth Annual Report of the Commissioner of Labor. 1889. Railroad Labor. Carroll D. Wright. Washington. 1890. Pp. 888.

The Fifth Annual Report of the Commissioner of Labor deals with the subject of Railroad Labor. It represents the results of field work from April, 1888, to April, 1889. During this time returns were obtained from sixty corporations, employing 241,910 persons. This represents a trifle over one-third the entire number of railroad employees in the United States; and, as the roads were selected with great care from different sections and classes, the results are fairly representative of the general condition of things.

An investigation of railroad labor has several advantages over an investigation of factory labor. In the first place, there are no private establishments; all are corporations accustomed, to a greater or less degree, to public enquiry into their affairs. Their books are in better shape for such enquiry, and the attempts to resist it are less. There is comparatively little piece-work, which makes the investigation a good deal simpler. There is less fear of giving away trade secrets, or of enabling a rival to figure on the cost of production, than is the case among manufacturers. All these things combine to make the task of the enquirer easier, and the result more trustworthy.

Nearly four-fifths of the railroad employees of the United States are paid at rates between \$1.00 and \$2.00 per day. The percentages at different rates are as follows:—

Under \$1.01,	7.3 per cent.
\$1.01- 1.20,	21.7 "
1.21- 1.40,	21.6 "
1.41- 1.60,	15.1 "
1.61- 1.80,	11.4 "
1.81- 2.00,	9.2 "
Over 2.00,	13.7 "

The average daily rate received by all persons was \$1.64½; but this, of course, was brought up by a comparatively small number who receive very high rates, for nearly two-thirds of the total number receive less than this average. An examination of the different groups of employees shows that "laborers," switchmen, and telegraph

operators are, as a rule, paid from \$1.00 to \$1.50 a day; firemen and brakemen mostly about \$1.75, the rates varying from \$1.50 to \$2.00; while the classes receiving more than \$2.00 per day are blacksmiths, carpenters, machinists, conductors, and engineers, and also a considerable group of switchmen, especially in the west.

One of the most extraordinary features in the whole situation is the small figure of time employed. "Laborers" are employed on an average less than 100 days in the year; brakemen and firemen a little over 150; telegraph operators, 164; switchmen, 176. Conductors are employed 207 days on an average, and engineers 237. This results from a combination of two causes. Part of it is due to the migratory character of railroad labor, as Colonel Wright expresses it; part to the fact that in some lines of work a considerable number of days of rest are needed. For instance, train crews on the best roads are kept steadily through the year but work only four days in the week, with occasional Sunday duty extra. From 210 to 240 days in the year, to a conductor or engineer, means steady employment, and represents his full annual earning power. On the other hand, the laborer works six days in the week as long as he has a job, and then goes somewhere else. His figures of annual earnings, taken from the books of the company, represent only a fraction of what he really gets. These two causes are so intermingled that it is hard to separate them, and they make the figures of annual earnings somewhat misleading. We give them, nevertheless, for what they are worth.

Occupations.	Total Persons.	Average Earnings.
Baggagemasters (36 roads).....	1,260	\$394
Baggagemen (18 roads).....	1,014	311
Blacksmiths (43 roads)	1,718	467
Brakemen (58 roads)	23,699	212
Carpenters (51 roads).....	8,583	330
Conductors (56 roads).....	6,134	575
Engineers (55 roads).....	5,540	957
Enginemen (15 roads).....	1,351	787
Firemen (60 roads).....	9,672	337
Flagmen (31 roads).....	2,111	244
Foremen (56 roads).....	7,086	463
Laborers (58 roads).....	90,104	124
Machinists (40 roads).....	4,984	431
Masons (28 roads)	874	227
Painters (38 roads).....	1,750	348
Switchmen (30 roads).....	4,262	264
Telegraph operators (38 roads)....	4,216	235

A much more important table is that which shows the wages paid in different sections of the country to different classes of employees.

	New Eng- land.	Middle.	South At- lantic.	Can. North- ern.	Northwest- ern.	Southwest- ern.	Pacific.
Baggagemasters	\$1.78	\$1.58	\$1.32	\$1.46	\$1.10	\$1.79	\$2.00
Baggagemen	1.67	1.46	1.42	1.61	1.49	1.55	1.94
Blacksmiths	2.36	2.06	2.39	2.25	2.67	2.26	3.11
Brakemen	1.80	1.73	1.26	1.86	1.96	1.75	1.96
Carpenters	2.14	1.89	2.10	1.92	2.32	2.14	3.07
Conductors	2.82	2.54	2.58	2.61	2.92	2.85	3.00
Engineers	3.32	3.15	2.91	3.07	3.55	2.79	....
Enginemen	3.24	3.20	1.52	2.27	....	....	....
Firemen	1.89	1.72	1.29	1.79	2.04	1.90	....
Flagmen	1.24	1.16	.89	.97	....	1.02	1.64
Foremen	2.33	1.81	1.66	1.81	1.88	1.78	2.46
Laborers	1.51	1.23	.88	1.21	1.21	1.30	1.87
Machinists	2.23	2.06	2.70	2.25	2.69	2.43	3.06
Masons	2.19	2.44	3.00	2.76	2.54	3.00	....
Painters	2.01	1.88	2.02	1.91	2.42	1.72	2.81
Switchmen	1.78	1.27	1.11	1.53	2.30	2.15	2.20
Telegraph Operators	1.42	1.34	1.50	1.47	1.67	1.38	2.09

It is not surprising to find that the highest wages are paid on the Pacific coast; but it will surprise many readers that the next highest wages, for distinctively railroad labor, are paid in New England. It is interesting to see that while blacksmiths, carpenters, masons, painters, and machinists are paid more per day in the west, baggagemasters and hands, conductors and engineers, on the whole, do quite as well in New England, and railroad laborers very much better.

Amid the many things to praise in the report there are comparatively few to criticise. The worst is probably the comparison of American and English railroad wages. The English wages are from employees' returns. It is always an error to compare employees' returns in one place with employers' returns in another; and in this instance the returns of English wages appear to have been made up with some unfairness. The places where high wages are paid have been carefully excluded, and the low ones carefully selected. For instance, there are no returns from any London terminal station, and only one from an important suburban station. By a curious blunder one really first-class London station is included in the list,

but *no returns at all* are given from it. We are astonished that this did not awaken Colonel Wright's suspicions.

The only other serious mistake we have noted, and that probably an oversight, is the occasional calculations of annual earnings on assumed full time instead of actual time,—for instance, on page 144.

It may have been difficult to use the figures of actual time in the way suggested; in that case it would have been better to compare only the wages per day, and omit the table of annual earnings altogether. It is certainly misleading to speak of the annual earnings of an engineer as \$1,000 when, as a matter of fact, he can only earn three-quarters of that amount in steady employment at full regular time.

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INDIANA.—*Second* Biennial Report (Eighth Volume) of the Department of Statistics 1887-88.* Wm. A. Peelle, Jr., Commissioner. Indianapolis. 1888.

IOWA.—*Third Biennial Report of the Bureau of Labor Statistics 1888-89.* E. R. Hutchins, Commissioner. Des Moines. 1889. Pp. cxiii, 440.

KANSAS.—*Fifth Annual Report of the Bureau of Labor and Industrial Statistics. 1889.* Frank H. Betton, Commissioner. Topeka. 1890. Pp. 407.

MICHIGAN.—*Eighth Annual Report of the Bureau of Labor and Industrial Statistics.* A. H. Heath, Commissioner. Lansing. 1891. Pp. vviii, 451.

MINNESOTA.—*Second Biennial Report of the Bureau of Labor Statistics. 1889-90.* John Lamb, Commissioner. Minneapolis. 1891. Pp. 377.

MISSOURI.—*Twelfth Annual Report of the Bureau of Labor Statistics. 1890.* Lee Meriwether, Commissioner. Jefferson City. 1890. Pp. 569, 141.

PENNSYLVANIA.—*Annual Report of the Secretary of Internal Affairs. Part III. Industrial Statistics. Vol. XVII. 1889.* Albert S. Bolles, Chief of Bureau. Harrisburg. 1890.

* A letter from Commissioner Peelle announces that the Third Biennial Report is in press and will soon be ready for distribution.

The Department of Statistics of the State of INDIANA has presented to the public in its eighth volume a neat book of about 550 pages, covering a very wide field, but, unfortunately, partaking too much of the nature of an advertisement. The object seems to have been rather the showing up of the attractive features of the state than the collection of simple facts. Although it is an error to speak of this department as one of the State Bureaus of Labor Statistics, it is by no means a fault that this one does not limit its scope to the Labor question. There seems to be no good reason why there should not be a Department of Statistics in each state of the Union, to which the duty of collecting statistics on all matters of importance might be delegated. Vital, criminal, social, economic, and finance statistics might all be gathered in one office, and the corps of statisticians which would spring up in response to the demand thus created would be able so to systematize the work as to make it truly scientific and of inestimable value. By the Commissioner's own confession the Indiana report falls far short of what it might be, and in his preface he asks for legislation to make the submission of returns compulsory. This would be a step in the right direction; but even with such a law, what results could be expected from the expenditure of the paltry sums now appropriated? Indeed, the Commissioner deserves great credit for accomplishing as much as he has with such limited means. Greater liberality in this direction would be approved of, at least by a majority of the intelligent tax-payers in every state.

The method adopted in this report was the collection of semi-official figures from county and town officers, and in some cases less than half of the schedules were returned. It is to be feared that in most of these large allowance ought to be made for the "personal equation," local pride.

The book is divided, not very logically, into four parts:—

- I. Introductory references, articles, etc.
- II. Cities and Towns.
- III. General Statistics for 1887.
- IV. General Statistics for 1888.

Under the caption "Cities and Towns" a short sketch of each town is given, with information concerning its advantages to settlers. Part I contains "articles" on the following somewhat heterogeneous subjects: Natural Gas, Marriage and Divorce, Paupers and Criminals,

Strikes (tables taken largely from the National report), the Drought of 1887, Agricultural Statistics, Live Stock, Social Statistics, Economic Statistics, Criminal Statistics, Fruit and Fruit Trees, Railroad Statistics, and Building and Loan Associations. Parts III and IV contain the tables on which these "articles" are based, and are of much more value than the rest of the report.

The IOWA report is devoted to Labor Statistics, but it covers a wide field including wages and cost of living, farms and farm labor, coal miners, women wage-earners, manufactures, stores, the mining industry, strikes and lockouts (1881-87), railroads, taxation, and savings banks. The returns are by no means complete, the limited appropriations in this as in most other states being a great drawback to the work. Some blunders have been made, however, which it is hard to excuse. Too much space is given up to the opinions of individual workingmen on subjects on which their opinions are of questionable value. In many cases in this report the opinion of the Commissioner would be of far more value than the many views he quotes.

Part IX of this report, on Taxation and Assessments, is very interesting and very valuable. The subject is an important one, and the information, although not at all tabulated, is in excellent form for study. Part X, on Taxation in Cities and Towns, is equally good. It would be well if other bureaus would take up these subjects.

In KANSAS the Bureau is ordered to collect Labor and Industrial Statistics, and the fifth report is divided into two parts : —

I. Industrial Statistics.

Manufacturing Industries.

Flouring Mills.

Newspapers.

Coal Mining.

II. Labor Statistics.

Wage Tables.

Working Women.

Labor Organizations.

Railroads.

Street Railways.

The collections from wage-earners were gathered through personal visits, but for the statistics of the first part recourse was had to the mails.

In no case do the returns claim to be complete, but the arrangement and tabulation is creditable. Almost invariably the figures are given for each separate case, many of the tables having been merely

"transcribed from the reports just as they were received." This takes up room, but it is good in that it enables the student to see exactly how the aggregates and averages have been obtained. The tables that follow are a queer combination of ridiculous blunders and strictly scientific methods. To give the "average months in operation" by counties, with 81 returns from Shawnee and only one return from nine others, is absurd enough in itself, but when it is complicated with the fact that in several of the counties only returning two or three industries one was a machine shop open the year round, the other a brickyard operated from four to six months, it becomes foolishness. In the same volume with this, however, we find one of the best classified wage tables that has yet appeared in this country. The table referred to is in the division on "Flouring Mills," and seems to be thoroughly scientific in every respect. Of the same nature is the table on page 181, showing, by classification, the monthly earnings of miners. This latter is the summary of a number of excellent detailed tables. It is a pity that, with so much that is good, there is mixed so much that is faulty.

According to the introduction, the information embodied in the MICHIGAN Report was obtained "not by the blank system, nor by special canvassers, but by the regular office employees of the bureau, who, in person, visited all of the shops and factories enumerated, and secured directly from each workman the facts desired." The work consequent upon this method, of course, limited the scope of the report, but the quality is excellent. The entire book is given up to figures, statistics pure and simple, and but few words are wasted in drawing conclusions. The Commissioner seems to have realized fully that it is his place to collect facts, and that to some one else is left the duty of speculation. Two hundred shops were visited, and returns were obtained personally from 8,838 workmen. The questions asked were: age, nativity, nativity of parents, conjugal condition, number in family, number supported besides wife and children, number of children attending school, number of weeks lost, causes of loss of time, weekly wages, annual earnings, other sources of income, total annual income; is home owned, mortgaged, amount paid on home during year, amount saved aside from payments on home; if renting, monthly rental; if boarding, cost per week; amount of life insurance, etc.; number of years in the United States, etc. The returns are not

complete, but so far as they go they are trustworthy. The tabulation is good. The whole forms a large mass of working material.

The MINNESOTA report opens with a stirring appeal for scientific statistical investigation. Commissioner Lamb appreciates the situation fully, and his introduction is very encouraging reading. "It is time," he says, "that men should understand that original investigation in any field of inquiry cannot be carried on without expense, nor with any degree of success, by novices in that line of effort. It might as well be understood first as last that the business of handling statistical work is destined to become a science just as surely as law, medicine, and theology have become so. The time is coming when quackery in statistical work will be just as reprehensible as quackery in any other professional calling."

Commissioner Lamb's report does not seem to be quite up to the high standard which he himself set, but it is, nevertheless, excellent. Chapter I devotes 148 pages to the subject of School Attendance, covering public and private schools, a criticism of half-time schools, school laws, comparison with foreign schools, truancy, etc. Tables 21 to 26 (pp. 110-147) are in excellent form, and the letters from individuals, although not usually approved of in statistical work, are so well selected and from such well-known authorities as to be of the greatest value. Chapter II, on Child Labor, besides good tables, contains lengthy citations from Col. Wright, and much other good matter. Chapter III, following logically the first two, is on Manual and Technical Training. This part contains a number of illustrations and lists of exercises which, while valuable in themselves, seem out of place here. The tables of workingmen's earnings are fair, but there is little value in the price list of staples, as there is no way of judging the quantities used. The state labor laws are given in full at the end.

Part I of the MISSOURI Report is of almost no value. After reading it through one is surprised, and agreeably so, to find Part II far superior. The figures are not complete,—in fact, they are very incomplete,—but they are valuable as far as they go, and the tabulation is quite satisfactory. The wages are taken from the pay-rolls of the employers, a method more exact than most. The workingmen's budgets, which occupy the last half of the book, are exceedingly interesting and of considerable value.

The second volume of this report is on Mines and Miners, being the report of the State Inspector. Only the first half is interesting to statisticians, the latter half being taken up with lists of companies and the "Record of Inspection." The figures given were reported by the mine operators themselves, and "every effort was made to obtain complete and accurate returns." It is a valuable contribution.

The methods employed by the PENNSYLVANIA Bureau are very antiquated. The first 205 pages of the report are given up to answers to questions as to causes of change in the value of farming land, which, of course, are not statistics. Tables follow this, showing, by townships, the number and acreage of farms, and whether occupied by owner or tenant. A small table on page 224 gives the price of agricultural implements annually from 1870 to 1889 inclusive, following which are long price lists of farm products for a series of years, and lists of transportation rates. The next inquiry, relating to miners' earnings, is the conclusion of last year's report. A praiseworthy attempt has been made to steer clear of the "average" fallacy, but it has not been altogether successful. Building and loan associations have been pretty thoroughly investigated, and the statistics given here are as good as any in the book. There is an "article" on the carpet industry, with numerous pictures and few statistics, and the opinions of workingmen occupy the last sixty-five pages.

FRANK R. HATHAWAY.

NOTES ON PRESIDENT WALKER'S ARTICLE ON STATISTICS OF THE COLORED RACE.

(1) NOTE BY PROF. H. A. NEWTON, YALE UNIVERSITY.

By taking the numbers in Column 2 of President Walker's table, giving the enumeration of the colored population, from 1790 to 1880 (*Publications of the American Statistical Association*, December, 1890, p. 102), and regarding 10,000 as the unit, we may construct a table of first and second differences as follows:—

TABLE I.

Year of Census.	Colored Population.	First Difference.	Second Difference.
1790	76	..	...
1800	100	24	...
1810	138	38	14
1820	177	39	1
1830	233	56	17
1840	287	54	-2
1850	364	77	23
1860	444	80	3
1870	488	44	-36
1880	658	170	126

The irregularity in the column of second differences shows large variations in the decennial increments of a population not subject (at least after 1810) to great changes from immigration or emigration. These variations may be due to actual irregularities in numbers of population, or to errors of counting, or to both. In fact, both causes must operate to some extent to produce the irregularities in Column 2. The numbers of the column do not enable us to ascribe to each cause its due influence, but they do furnish the means of estimating the total amount of the irregularity in Column 2 arising from the combined causes, especially the amount of the great deviation in 1870. Let us construct for this purpose a new series of numbers whose second differences shall increase regularly, the third differences being therefore constant, a series that shall differ as little as possible from the numbers in the second column of the table above. By trial I find that with the first term 75, the first first-difference 27, the first second-difference 7, and the third differences constantly unity, we obtain a fair approximation to the numbers in the column named. Calling the two sets of numbers respectively the *observed* and the *computed*, and adding two columns of differences, and a column of observed-computed, we make the following table: —

TABLE II.

Year.	Observed.	Computed.	First Difference.	Second Difference.	Observed-computed.
1790	76	75	...	..	+1
1800	100	102	27	...	-2
1810	138	136	34	7	+2
1820	177	178	42	8	-1
1830	233	229	51	9	+4
1840	287	290	61	10	-3
1850	364	362	72	11	+2
1860	444	446	84	12	-2
1870	488	543	97	13	-55
1880	658	654	111	14	+4

The numbers in the third column exhibit evidently the general law of growth of the numbers in the second column, if the number for 1870 be left out of account. Compared, then, with a steadily increasing people, the deficiency in 1870, due to defective numeration, and to a real deficiency of population if that existed, is about 550,000.

The signs of the numbers in the last column are (omitting 1870) alternately plus and minus, so that it is not possible to obtain a smoothly increasing series of numbers that will represent Column 2 much better than that in Column 3. This alternation further shows that deductions from growth in intervals of 20 years are much more valuable than those from intervals of 10 years or of 30 years.

To test, however, the possibility of obtaining a better series than Column 3, I assumed an unknown correction to each of the numbers 75, 27, 7, and to the 3rd difference that had been used in computing Column 2. *Fourth differences I assumed as before equal to zero.* Then, by the method of least squares, I computed the most probable values of those unknown corrections. Of course the year 1870 was omitted. The result was a series of numbers a very little, and only a very little, better than those in Column 3 in Table II. The sum of the residual squares was reduced from 59 to 54.5. The resulting number for 1870 was 5,431,000, essentially the same as before.

(2) NOTE BY HERMANN HOLLERITH, PH.D.

The comparisons heretofore made for the purpose of demonstrating or illustrating the defective enumeration of the colored population at the census of 1870 have been so made as not to eliminate the most

variable factor, *i. e.*, natural increase, which, as we know from the age tables of the censuses of 1870 and 1880, fluctuated greatly during the decades 1860 to 1880, due to variation in the birth rate.

It would seem desirable, therefore, that the comparison be made in such a manner that the birth rate, with its natural fluctuations, be eliminated.

This can most readily be done by means of the age tables, under the assumption that there is neither immigration or emigration of the colored population, or else that these factors counterbalance each other. The survivors of the colored population at one census should be enumerated at the next census as the colored population ten years of age and over.

If we compare in this manner the censuses of 1840, 1850, 1860, 1870, and 1880, we find that —

Of 1000 colored persons enumerated in 1840, 870 survived in 1850.									
"	1000	"	"	"	"	"	1850, 848	"	" 1860.
"	1000	"	"	"	"	"	1860, 794	"	" 1870.
"	1000	"	"	"	"	"	1870, 928	"	" 1880.

In comparing the censuses in this way, we eliminate entirely the effect of variations in the birth rate, which we know has fluctuated greatly since 1850. Evidence of this is clear and positive in our age tables. The birth rate was checked during the period of the war, and was abnormally high immediately after the war, and during the decade of 1870 to 1880.

It might be contended that the death rate during the war was abnormally large, and that this would account for the number of survivors from 1860 to 1870 being so low, but, on the other hand, this would not, by any means, account for the fact that, according to the census, 928 out of each 1000 colored population at 1870 survived to 1880, as against 848 from 1850 to 1860.

Again, if we make a similar comparison for the native whites, we find that of each 1000 enumerated in 1870 only 917 were surviving in 1880. According to these figures, it would appear that there was a lower rate of mortality among the colored than among the native whites during the period from 1870 to 1880. This we know is contrary to all careful observation in cities having a large colored population, and a thorough registration of deaths.

There is but one possible explanation of these discrepancies, namely, the defective enumeration of the census of 1870.

To determine, as far as we can from these figures, the probable deficiency of the colored enumeration of 1870, let us compare the total colored population in 1850 with the colored population in 1860, ten years of age and over. We find the former to be 1.18 times the latter. If we compare in the same manner the total colored population in 1840 with the colored population ten years of age and over in 1850, we find them to be in the ratio of 1.15 to 1. In 1880 there were enumerated 4,611,207 colored persons ten years of age and over, which multiplied by the factor 1.18 would show that there should have been 5,400,000 total colored population in 1870, so to have left surviving the above number in 1880, on the assumption that the mortality and the age distribution of the colored population was the same during the decade 1870 to 1880 as in the decade 1850 to 1860. If, however, we apply the ratio obtained from 1840 to 1850, we would have the total colored population of 1870 as 5,300,000. Upon a consideration of the above figures, it would seem that the total colored population in 1870 should have been between 5,300,000 and 5,400,000.

THE BIRTH RATE IN EUROPE DURING THE LAST TWENTY YEARS.

The slight increase of the population of France has lately attracted much attention. A fresh examination of the birth rate by Charles Richet appears in the January number of the *Revue Scientifique*, of which the following is a summary:—

The decline in the increase of the population of France, already noticeable at the beginning of the century, continues to increase each year. During the last ten years it has grown so marked that no little uneasiness has been aroused by it. M. Richet does not attempt to smooth over this fact, or to reassure people by denying its validity. He simply compares the condition of France with that of other countries, and shows that there is a general demographic phenomenon, since, in all the principal countries of Europe, for several years past, the birth rate has shown a tendency to decrease.

For this purpose he takes the bare figures, that is, the number of births per 1000 inhabitants. In order to be thorough it would be necessary to consider other facts, such as not only the total population, but the households where the women are between 20 and 45

years of age. For the sake of simplicity, however, he studies only the rough birth rate computed with reference to the population. It is needless to add that these figures furnish only one of the elements which cause the growth of a population; for emigration reduces it, immigration adds to it, and death decreases it.

Increase of births is only one of the factors in the growth of a population, and he who considers this alone can know only a part (the most important part it is true) of the conditions of its increase. Omitting Spain and Russia, for which there are no trustworthy figures, an examination is made of the statistics of France, England, Scotland, Belgium, Germany, Austro-Hungary, and Italy. The results of the several calculations are given in the following table:—

Year.	France.	Germany.	Scotland.	Austria.	Hungary.	England.	Belgium.	Italy.
1873	26.1	41.0	34.7	39.3	42.0	37.8	33.5	37.5
1874	26.2	42.1	35.0	39.1	42.0	37.5	33.5	36.0
1875	26.0	43.0	35.6	38.8	44.0	38.0	33.7	38.5
1876	26.2	42.6	35.5	38.9	43.7	37.5	34.5	40.5
1877	25.5	41.8	36.0	38.2	43.5	38.8	34.0	38.0
1878	25.2	40.0	35.9	37.8	43.0	37.8	33.2	36.8
1879	25.1	40.0	34.8	38.0	45.0	36.7	33.0	38.6
1880	24.5	39.5	34.2	37.2	43.5	36.3	32.2	34.8
1881	24.2	39.0	33.6	38.0	43.8	35.8	32.8	36.5
1882	24.8	38.8	33.5	38.8	45.0	35.3	33.0	38.2
1883	24.7	38.5	33.0	38.0	44.9	33.8	32.2	38.2
1884	24.6	38.5	33.6	38.6	47.0	33.2	32.1	39.9
1885	24.4	38.5	32.5	37.8	47.0	32.6	31.8	38.8
1886	24.1	38.4	32.4	38.4	47.5	32.5	31.2	37.6
1887	23.7	38.6	31.4	38.8	47.0	31.6	30.9	39.5
1888	23.2	....	30.6	38.7	....	31.0	....	36.4

If we take the average for the years 1873, 1874, and 1875 and compare it with the average for 1886, 1887, and 1888, we have —

	1873-1875.	1886-1888.	Difference.
France.....	26.1	23.7	2.4
England.....	37.7	31.7	6.0
Scotland.....	35.1	31.5	3.6
Austria.....	39.1	38.6	0.5
Hungary....	42.7	47.2	+4.5
Germany.....	42.0	38.5	3.5
Belgium.....	33.6	31.1	2.5
Italy.....	37.3	37.8	+0.5

By taking the absolute numbers of births since 1873, it is seen that the maxima do not fall in the later years. So, in proportion to the population the birth rate has not increased, as the total number of births has diminished.

The following table shows the year in the period considered of the maximum number of births in the different countries of Europe :—

	Maximum No. Births.	Year.
France	906,682	1876
England.....	906,750	1884
Scotland.....	129,041	1884
Austria.....	915,702	1888
Hungary.....	773,255	1886
Germany.....	1,881,218	1876
Belgium.....	185,069	1884
Italy.	1,195,000	1887

We see from this that, although the countries of Europe have not lost in population, and still continue to increase, the maxima of births did not occur during the last year, *i. e.*, the year of greatest population, as one might have been led to expect. But the first table is more instructive. If Hungary is omitted where the births are increasing, the cause of which we do not know, and Austria, where since 1881 the annexation of Bosnia and Herzegovina has notably changed the demographical conditions, it is seen that the number of births in France, England, Germany, Scotland, and Belgium decreases with perfect regularity from 1877 to 1888.

DIMINUTION OF BIRTH RATE PER 1000 INHABITANTS.

Year.	France.	England.	Scotland.	Germany.	Belgium.
1878	0.3	1.0	0.1	1.8	0.8
1879	0.1	0.9	1.1	0.0	0.2
1880	0.6	0.4	0.6	0.5	0.8
1881	0.3	0.5	0.6	0.5	+0.6
1882	+0.6	0.5	0.1	0.2	+0.2
1883	0.1	1.5	0.5	0.3	0.8
1884	0.1	0.6	+0.6	0.0	0.1
1885	0.2	0.6	0.1	0.0	0.3
1886	0.3	0.1	0.1	0.1	0.6
1887	0.4	0.9	1.0	+0.2	0.3
1888	0.5	0.6	0.8	.....	.....
Average.....	0.2	0.7	0.5	0.3	0.3

In Italy there is evidently a similar movement, but it is very irregular. Although the errors from one year to another may be considerable, it is probable that the figures are quite exact, because of the extreme care with which Italian statistics are collected.

According to M. Richet there can be no doubt that the decrease in the number of births is due to voluntary action. It is probable that the most advanced people in civilization are most responsible for the decrease. Yet, in general, M. Richet regards France (with Belgium), England (with Scotland), and Germany as standing at the head of European civilization; and in these three nations the birth rate since 1877 has greatly decreased,—with this difference, however, that England and Germany can permit it to diminish still much more without having the death rate exceed the birth rate, while in France, where the latter rate is very feeble, the time is rapidly approaching when the number of deaths will exceed the number of births.

GARY N. CALKINS.

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UNITED STATES CENSUS BULLETINS.

No. 16. Dec. 13, 1890. *Population of the United States by States and Territories: 1890.* Pp. 10.

This gives the official count of the population as 62,622,250, correcting the rough count bulletined in No. 12. A further discussion of the reasons for the apparent reduction in growth of population is introduced.

No. 17. Dec. 16, 1890. *Preliminary Statistics of Education for Louisiana, New Hampshire, Wisconsin, various cities, and the Church of Jesus Christ of Latter-Day Saints.* By James H. Blodgett. Pp. 10.

The statistics presented in this bulletin are derived from two independent sources: information obtained by the enumerators and information from the school authorities. The following table exhibits the gain or loss of population and of enrollment in public schools, over 1880, in percentages:—

	Louisiana.	New Hampshire.	Wisconsin.
Gain of population,	19.01	8.51	28.23
Gain of enrollment,	53.52	—7.51	16.97

The pupils attending public, parochial, and private schools in 1890 are thus compared:—

	Louisiana.	New Hampshire.	Wisconsin.
Public,	124,370	59,813	350,342
Parochial,	7,478	4,940	53,772
Private,	17,627	2,608	5,176

The last table shows that the schools maintained by the Mormons in Arizona, Idaho, and Utah have a total of 96 teachers with 5092 pupils.

No. 18. Dec. 26, 1890. *Statistics of Churches.* By Henry K. Carroll. Pp. 26.

The present religious census is confined to the following points:—

1. Location of congregations.
2. Number of congregations, including chapels, missions, etc.
3. Number of ministers.
4. Number of church edifices, including all halls used as places of worship.
5. Value of church property.
6. Number of members or communicants.

The present bulletin affords statistics for only 14 out of the more than 140 denominations in the United States, upon which a report will finally be made. The following summary indicates the denominations covered:—

Denominations.	Number of Organizations.	Church Edifices.	Seating Capacity.	Hall, etc.	Seating Capacity.	Value of Church Property.	Communicants or Members.
United Presbyterian Church...	866	831	264,298	50	5,530	\$5,408,084	94,402
Church of the New Jerusalem..	154	87	20,810	70	7,165	1,386,455	7,095
Catholic Apostolic Church.....	10	3	750	7	350	66,050	1,394
Salvation Army.....	329	27	12,055	300	86,801	37,350	8,662
Advent Christian Church	580	294	80,286	281	34,705	465,605	25,816
Evangelical Adventists.....	30	22	5,855	5	775	61,400	1,147
Life and Advent Union	28	7	2,250	19	1,830	16,790	1,018
Seventh-Day Baptists.....	106	7	21,467	18	575	264,010	9,123
Seventh-Day Baptists (German)	6	3	1,980	1	....	14,550	194
General Six Principle Baptists.	18	13	3,600	4	400	19,500	937
Christian Church, South.....	143	135	46,005	8	700	137,000	13,004
Schwenkfeldians	4	6	1,925	....	....	12,200	306
Theosophical Society.....	40	1	200	38	1,115	600	695
Brethren in Christ.....	63	34	13,605	24	980	57,750	2,060

It is a curious fact that Michigan with 1,099 ranks first in members of the Salvation Army; Illinois has 922, Pennsylvania 772, Massachusetts 656, Ohio 655, and New York 615. The county tabulation of Michigan shows that the membership of this sect is fairly well scattered throughout the State.

No. 19. Dec. 30, 1890. *Vital Statistics of the Jews in the United States.* By John S. Billings. Pp. 19. Diagrams, 4.

This presents partial results of an inquiry made of about 10,000 Jewish families, including 60,630 persons. The schedules furnished were as a rule from families who had been in the United States five or more years. The following are some of the social facts deduced: 1. The proportion of males to females among the Jews was larger than in the general population in 1880, being 109.53 males to each 100 females as against 103.57 to 100 in the general population in 1880. 2. The proportion of children under five years of age is less than it is in the average white population in the proportion of 9 to 13, while from five to fifteen years of age it is greater in the proportion of 29 to 23. 3. Among the males the proportion of those engaged in commercial occupations is very large. Of the 18,115 males reported, but 383 were engaged in agricultural pursuits. 4. The marriage rate is very low, only 7.4 per 1000. 5. The average number of children born to each of the mothers was 4.66. The mothers who were born in the United States average only 3.56 children each, as against 5.24 for those born in Germany, 5.63 for those born in Russia and Poland, 5.27 for those born in Hungary, and 5.44 for those born in Bohemia, indicating a diminished fertility in those women born in this country. 6. The death rate was 7.11 per 1000, very low as compared with the general death rate. 7. The population affected with disease Dec. 31, 1889, was 10.17 per 1000.

No. 20. Jan. 5, 1891. *The Anthracite Coal Fields of Pennsylvania.* By John H. Jones. Pp. 13.

Shows the location of the anthracite fields, with districts, mines, and production for 1889; also the initial lines of transportation, shipments by decades, production by counties, and general distribution of product. A complete directory of anthracite collieries is added.

No. 21. Jan. 15, 1891. *Population of New Hampshire by Minor Civil Divisions.* Pp. 4.

It is shown that the population of the state has increased from

346,991 to 376,530, or 8.51 per cent. Three-fifths of all the towns, however, have less population than in 1880,—a decrease which is perhaps confined to the smaller agricultural towns. Most of the towns with a population between 1000 and 1500 have lost population. In commenting upon these tendencies, the *Nation* in its issue of January 29th presents this table:—

Date of Census.	Population.			Percentage of Total Population.		
	Of 35 towns having upwards of 2,000 inhabitants each in 1890.	Of 69 towns having between 1,000 to 2,000 inhabitants each in 1890.	Of 145 towns having less than 1,000 inhabitants each in 1890.	In towns over 2,000.	In towns between 1,000 and 2,000.	In towns under 1,000.
1890	207,455	93,362	75,723	55.10	24.79	20.11
1880	107,338	94,601	85,052	48.23	27.26	24.51
1870	137,440	92,314	88,555	43.18	29.00	27.82
1860	126,235	97,815	102,020	38.71	30.00	31.29
1850	113,508	97,628	106,842	35.69	30.71	33.60

No. 22. Jan. 20, 1891. *Distilled Spirits Consumed in the Arts, Manufactures, and Medicine.* Pp. 9.

This is a preliminary report for the year 1889. The total consumption of each form of distilled spirits by states is compiled from the returns of wholesale druggists and manufacturers, eleemosynary institutions, and retail apothecaries. The consumption amounted to 10,976,842 proof gallons. This is the first complete estimate yet made in the United States. Of this total, alcohol is represented by 6,745,152 gallons. A special attempt was made to obtain facts in regard to the use of alcohol as a beverage; and it is stated that the quantity thus consumed is larger than is supposed. About 15 barrels of alcohol are daily consumed in New York City for this purpose, used especially by a certain foreign element of the population.

No. 23. Jan. 21, 1891. *Areas of States and Counties.* Pp. 14.

The geographer, Henry Gannett, reports that the areas of the States and Territories are identical with those published by the Tenth Census, excepting as they have been modified by the formation of the Territory of Oklahoma; division of Dakota into North and South

Dakota; and the transfer of a small part of South Dakota to Nebraska. The areas of counties have been examined and revised. In particular, changes have been made in accordance with the state geological survey of New Jersey, and returns published by the Department of Agriculture of Kansas.

No. 24. Jan. 24, 1891. *Population of Massachusetts by Minor Civil Divisions.* Pp. 6.

The statistics here presented are fully covered in the article of Hon. Horace G. Wadlin, published in this number of the *Publications*.

No. 25. Jan. 29, 1891. *Statistics of Indians.* By Thomas Donaldson, special agent. Pp. 14.

This contains statistics of Indians residing in the United States, tabulated according to sex in the several states; ration Indians; taxed or taxable; and those living on or off reservations. The total number of Indians, exclusive of Alaska, is 249,273. They are classified as follows:—

Indians on reservations (not taxed or taxable)	133,382
Five civilized tribes (Indians and colored)	66,289
Pueblos,	8,278
Six nations, and others in New York,	5,304
Eastern Cherokees in North Carolina,	2,885
Self-sustaining, counted in general census,	32,567
Prisoners of war (Apaches)	384
In state or territorial prisons,	184

249,273

Of the reservation Indians there has been a decrease of 1121 as compared with the Commissioner's report of 1889. They are decreasing from natural causes. Rations are issued to 34,675 Indians; of these 12,183 are in South Dakota. On the reservations 98,707 are self-supporting. Of the 32,567 taxed or taxable (self-sustaining) Indians 10,263 are in California; 6991 in Michigan, 3404 in Nevada, and 2899 in Washington. This accounts for three-fourths. It is announced that the report upon the condition of the Indians will soon be printed.

No. 26. Jan. 30, 1891. *Coal-mining Industry of Maryland in 1889.* By John H. Jones. Pp. 6.

Shows the districts, mines, production, and shipments of coal, with a complete directory of the collieries. The total production in 1889 was 2,939,715 short tons, valued at 85.6 cents per ton at the mines.

In 1880 it was valued at \$1.16 a ton. The output fell off in 1889, owing to lack of transportation facilities due to abandonment of Chesapeake & Ohio Canal.

No. 27. Jan. 30, 1891. *Coal-mining Industry of Alabama in 1889.* By John H. Jones. Pp. 6.

This bulletin is of interest as showing the great increase of the coal output in Alabama since 1880. In 1889 it was 3,378,484 tons as compared with 323,972 in the former year. A directory of collieries is given.

No. 28. Jan. 28, 1891. *Freight Traffic on the Great Lakes.* By Henry C. Adams. Pp. 21.

This bulletin represents the commerce of the Great Lakes for 1889, excepting the coastwise trade between Canadian ports. It is noted that the chief point of interest in the exhibit is that three commodities — coal, iron ore, and lumber — comprise 75 per cent of the total cargo tonnage of the lakes. If we add corn, wheat, and mill products, less than 10 per cent is left. The chief characteristic of the lake commerce is its simplicity. The total cargo tonnage in 1889 (exclusive of Canadian coastwise trade) was 27,460,260 tons. It should be observed that this volume is not measured as in the case of foreign commerce by taking the aggregate of receipts and shipments, but by taking only one of these,—the larger one for each port. It is impossible to get absolutely accurate statistics here, for from the returns it appears that the total receipts exceed the total shipments 2.58 per cent. For the total movement of traffic Chicago is credited with 15.59 per cent; Buffalo, 13.14 per cent; Escanaba, 7.08 per cent; and Cleveland, 7.07 per cent. The tonnage in all the detailed tables is analyzed into four classes,—products of agriculture; products of mines and quarries; other products (animal products and lumber) and manufactures and miscellaneous merchandise. The total ton mileage on the Great Lakes for 1889 is reckoned as 15,518,360,000 ton miles as compared with the aggregate ton mileage of railways for the year ending Jan. 30, 1889, of 68,727,223,146. The lake tonnage was therefore 22.6 per cent of the railway tonnage. Statistics are also added showing the freight tonnage which passed through Saint Mary's Falls canal in the year ending June 30, 1890. The statistics for this bulletin were collected by Mr. Charles H. Keep.

No. 29. Feb. 4, 1891. *Transportation. Changes in Floating Equipment on the Great Lakes since 1886.* Pp. 10.

This bulletin shows the radical changes which have taken place in the class of vessels used for transportation on the Great Lakes, and also the increase in the tonnage and valuation. The increase is as follows:—

	1886.	1890.
Net tonnage,	634,652	826,360
Valuation,	\$30,597,450	\$58,128,500

The substitution of steam for sailing vessels is rapidly progressing. The comparison is as follows:—

	1886.	1890.
Steam tonnage,	324,885	523,702
Sailing tonnage,	309,767	302,658

In the opinion of the special agent, Henry C. Adams, "the facts indicate that a new factor is being introduced into the problem of transcontinental transportation." The facts show that the steam vessels are of a constantly increasing size, and that the "traffic of the Great Lakes is rapidly coming under the control of companies having at their command large capital." The larger part of this bulletin is compiled from *Lloyd's Inland Register*.

No. 30. Feb. 11, 1891. *Alaska, Statistics of Population. 1890.* Pp. 9.

The population of Alaska is stated to be 21,929, with a possible increase of 8400 when further returns from the interior are received. Detailed statistics are furnished only for the First District, which includes about one-quarter of the total population. For this district data are furnished in regard to school attendance, nativity, color, and sex of persons of school age; distribution of native tribes; number who are able to read and write and speak English; and numbers of males of voting age.

No. 31. Feb. 14, 1891. *Convicts in Penitentiaries. 1890.* By Frederick Howard Wines.

The total number of convicts in penitentiaries June 30, 1890, is reported at 45,233. This gives a ratio of convicts to the population of 722 to million as compared with 709 in 1880. This total does not include felons who are imprisoned in county penitentiaries, or even those felons which in some states are confined in houses of correction or jails. This bulletin therefore affords only an approximate

indication of the numbers of convicted felons. In respect to color the convicts are divided as follows:—

White,	80,546
Negroes,	14,267
Chinese,	237
Japanese,	8
Indians,	180

Of the 80,546 white convicts 23,094 are native born. A further analysis shows that the foreign population of the country constitutes, directly or indirectly, in the persons of the foreign born or their immediate descendants considerably more material for state prisons than the entire native population, the difference being represented by 1009. Of the penitentiary convicts 1791 are women, or less than 4 per cent as compared with 4.5 per cent in 1880. The states in which there has been both an absolute and relative decrease in the number of the convicts are Maine, New Hampshire, Vermont, Michigan, Alabama, Mississippi, Nevada, and Wyoming.

No. 32. Feb. 24, 1891. *Distribution of Population in Accordance with Mean Annual Rainfall.* By Henry Gannett. Pp. 4.

Three-fourths of the population inhabit the region in which the annual rainfall is between 30 and 50 inches. A table is published showing the percentage of the population found in each grade of rainfall in 1870, 1880, and 1890, and the density of population in each grade at the same period.

No. 33. Feb. 25, 1891. *Distribution of Population with Reference to Mean Annual Temperature.* By Henry Gannett. Pp. 4.

The mean annual temperature of the United States is 53 degrees. More than half the population live under a temperature between 45 and 55 degrees. The most rapid proportional increase in population in the past twenty years has been in the regions where the temperature was either below 40 degrees or above 75 degrees,—that is, the extremes.

No. 34. Feb. 26, 1891. *Centre of Population: 1890.* By Henry Gannett. Pp. 4. Maps 2.

The method of determining the centre of population is described, and a table and two maps are given showing the position of this centre at each census period since 1790. During the past decade it has moved northward and westward 48 miles. The northward movement is due to the development of the cities of the northwest and Wash-

ington, and increase of population in New England. The centre is now 20 miles east of Columbus, Indiana. The centre of the area of the United States, excluding Alaska, is in northern Kansas.

No. 35. Feb. 27, 1891. *Irrigation in Arizona.* By F. H. Newell. Pp. 8.

This is the first report ever published in connection by the census department on the subject of irrigation. A little less than one-tenth of one per cent of the total area of Arizona is irrigated for raising of crops. The average cost of water right was \$7.07 per acre; the selling price placed upon this by the farmer was \$12.58; and the average annual cost for water was \$1.55 per acre.

No. 36. February 28, 1891. *Statistics of Education. Arizona, California, Connecticut, District Columbia, Maine, Maryland, Massachusetts, Montana, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Vermont, Virginia, Wyoming, and eighty-three Cities.* By James H. Blodgett. Pp. 27.

This is a continuation of the census work outlined in Bulletin 17. There is a brief discussion of the elements of error which enter into educational statistics, followed by table for each state. Maine, New Hampshire, and Vermont show a loss of enrollment.

No. 37. March 7, 1891. *Population by Counties. North Atlantic and South Atlantic Divisions.* Pp. 7.

This Bulletin is interesting in its showing the decrease or increase of population of the several counties in the states included. Although all the northern states show some increase, the gain in some regions has had to overcome decided losses in other sections. For example, 7 of the 16 counties of Maine show a loss. Rhode Island, Connecticut, and West Virginia are the only states in the Atlantic division which show a positive gain in every county.

No. 38. March 10, 1891. *Viticulture. Statistics of Grape Growing and Wine Production in the United States.* By H. Garduer. Pp. 11.

This represents the partial results of the first special census investigation of the extent and value of the grape, raisin, and wine industries of the United States. These industries represent a value of plant of \$155,000,000, giving employment to 200,780 persons. The tables show the area and production of vineyards and the capital invested, with description of the wines produced in the different sections of the country.

REPORTS OF STATE BOARDS OF CHARITIES AND CORRECTIONS.

Twenty-fourth Annual Report of the New York State Board of Charities. Transmitted to the legislature Feb. 5, 1891. Pp. 74.

This is one of the best arranged state reports of charities. The statistical tables show the value of property held by the various charitable, correctional, and reformatory institutions of the state; the budget for 1890; and the number of persons in the several institutions. The population of these beneficiaries is thus classified:—

Classes of Inmates.	October 1, 1890.	October 1, 1889.
Insane.....	16,022	15,538
Idiotic and feeble-minded.....	1,387	1,330
Epileptic.....	482	584
Blind.....	694	657
Deaf.....	1,329	1,328
Dependent children.....	23,289	20,949
Juvenile offenders.....	4,610	4,765
Reformatory prisoners.....	1,102	944
Disabled soldiers and sailors..	1,023	973
Hospital patients.....	4,118	3,782
Aged and friendless persons..	6,946	7,007
Ordinary poor-house inmates..	9,893	9,960
Total.....	70,895	67,781

The number of insane in the care of the various asylums, including poor-houses and private asylums, has steadily increased:—

	Males.	Females.	Total.
1880	4,211	5,326	9,537
1885	5,763	6,944	12,707
1890	7,505	8,517	16,022

The value of the property held amounted to \$64,432,000 Oct. 1, 1890, and the total expenditure for the year to \$16,349,000. This is nearly double the sum expended in 1880.

Twenty-second Annual Report of the Board of State Charities and Corrections of Rhode Island, 1890. Pp. 142.

There is no summarized table in this report showing the population of charitable and correctional institutions,—a defect which might easily be remedied to great advantage for the public. From the detailed reports it would appear that the number of inmates of the work-house

and House of Correction increased slightly during the year. In analyzing the causes of commitment the report observes that "how much of the variation from year to year in the numbers of certain classes of offenders committed is due the greater or less prevalence of offences, and how much to varying degrees of activity in arresting the offenders, cannot be known." The number of insane in the state asylum is reported as follows:—

	Men.	Women.	Total.
Jan. 1, 1885	165	149	314
" 1890	231	262	493
" 1891	238	277	515

Here again great care is necessary in drawing deductions from these statistics since there has been a change in the method of commitment. The number of inmates in the State Almshouse has decreased from 255 to 236; and in the Prison from 133 to 105. There was also a smaller number of commitments in the Industrial Schools.

Twelfth Annual Report of the State Board of Lunacy and Charity of Massachusetts. January, 1891. Pp. 205, lxxxiv.

This includes reports, with statistics, of the superintendent of indoor poor, of out-door poor, and the inspector of institutions.

The following table shows the change in the insane population since 1875.

	Increase of Total Population. Per cent in 5 Years.	Known Insane.			
		According to Census.		Under State Supervision.	
		Numbers.	Increase. Per cent in 5 Years.	Numbers.	Increase. Per cent in 5 Years.
1875	13.29	3,637	36.62	2,722	21.11
1890	7.69	5,127	40.96	3,724	36.81
1885	8.92	5,263	2.65	4,543	21.99
1890	15.28	.....	.....	5,652	24.41

The leading assigned causes for insanity remained the same. Intemperance and hereditary predisposition are the leading causes. In the 218 almshouses of the state there were 4582 inmates April 1, 1890. The report shows that the average number of the poor throughout the state receiving their full support was 8629, and partial support 15,337, making a total of 22,125. The net cost was \$1,805,641. There has been a continuous decrease in the number since 1885. There are interesting summary tables showing the comparative and mean age, occupations, and civil condition of the insane.

Eleventh Biennial Report of the Board of State Commissioners of Public Charities of Illinois, 1888-1890. F. H. Wines, Secretary, Springfield. 1890. Pp. 322.

There are eleven state charitable institutions of which detailed reports are made. There are four hospitals for the insane, an institution for the education of the deaf and dumb, one for the blind, an asylum for feeble-minded children, a sailors' and soldiers' home, a soldiers' orphans' home, an eye and ear infirmary, and a reform school. The following table exhibits the population, expenses, income, and cost for 1875 to 1890:—

	Gross Ordinary Expenses.	Income not from State.	Cost to State.	Average Number.	Per Capita Cost. Cents omitted.	
					Gross.	Net.
1875	\$373,998	\$52,026	\$321,972	1,795	\$250	\$215
1876	489,791	65,019	424,771	2,064	237	205
1877	482,071	51,940	430,130	2,074	231	207
1878	557,558	44,450	513,107	2,482	224	206
1879	551,214	48,498	507,715	2,707	202	187
1880	617,075	53,877	563,198	2,926	210	192
1881	655,861	58,894	597,166	3,135	209	190
1882	687,155	66,169	620,986	3,209	214	193
1883	714,421	62,552	651,869	3,471	205	187
1884	741,040	68,473	672,567	3,702	200	181
1885	864,329	65,137	799,191	4,444	193	179
1886	960,705	93,010	867,695	5,093	188	170
1887	1,014,018	78,739	935,279	5,230	180	165
1888	808,550	68,025	740,524	5,930	181	166
1889	1,081,773	76,156	1,005,617	6,024	179	166
1890	1,081,651	85,050	996,601	6,196	174	160
Total...	\$11,680,218	\$1,031,822	\$10,648,396	3,786	\$197	\$180

Fourth Biennial Report of the State Board of Supervision of Wisconsin Charitable, Reformatory, and Penal Institutions for the two years ending Sept. 30, 1890. Madison. 1891. Pp. 239.

The average population cared for in the two insane hospitals, schools for the deaf and blind, industrial school, prison, and state public school in 1890 were 2576. A comparison of the periods 1874-81 and 1882-90 shows that there has been no great increase except in the prison.

	1874-81.	1882-90.
Insane hospital,	864	1110
School for deaf,	146	194
“ “ blind,	66	70
“ “ boys,	859	834
State prison,	282	480

HEALTH AND VITAL STATISTICS.

Forty-eighth Report to the Legislature of Massachusetts Relating to the Registry and Return of Births, Marriages, and Deaths for the year ending Dec. 31, 1889, together with Returns of Libels for Divorce and the Returns of Deaths Investigated by the Medical Examiners. Editorial remarks by Samuel W. Abbott, M.D. Boston. 1890.

The changes in the marriage, birth, and death rates since 1850 are indicated in the following table:—

Year.	Marriages per 1000.	Births per 1000.	Deaths per 1000.
1861-65	11.7	28.8	18.7
1856-60	9.8	29.5	17.9
1861-65	4.3	25.5	20.7
1866-70	10.5	26.1	18.2
1871-75	9.9	27.6	20.8
1876-80	8.0	24.8	19.2
1881-85	9.3	25.1	19.8
1886	9.0	25.4	18.6
1887	9.5	25.8	19.8
1888	9.3	25.9	19.9
1889	9.4	26.2	19.2

This indicates that the excess of birth rate over death rate is gradually diminishing, although the excess is somewhat greater since 1885 than in the half-decade immediately preceding. A very complete table is presented on page 240 of the Report of similar rates for seventeen foreign countries, from which it appears that in the period 1861-80 Massachusetts had the lowest birth rate; that its death rate was the lowest, save Norway and Sweden; while its marriage rate was exceptionally high, that of Hungary alone exceeding it. The same comparative characteristics are in the main true for the years 1887 and 1888. The natural rate of increase of Massachusetts is therefore very low as compared with European countries. The birth rate of Massachusetts has been very gradually increasing since 1879; and for the first time since 1875 has it passed above 26 in the 1000. An interesting analysis is made showing that the birth rate is by far the largest in cities having over 10,000 inhabitants, where it is from 27 to

30 per 1000, while in the 96 towns with an individual population of less than 1000 the rate was less than 16. There was but little change in 1889 in the ratio of males to females. The excess of children born of foreign parents over those born of native parentage was greater than in any year since the beginning of registration. The number of plural births was considerably greater than in any previous year; while the number of illegitimates was less than in the immediately preceding year, although 1.8 per 1000 of births greater than the average of twenty years, 1870-89.

The average age at marriage of all bridegrooms was 29.1 years, and of men marrying for the first time, 26.9 years. The ages for women were 25.8 and 24.5 respectively. The increase in the age of brides is more marked than that of bridegrooms.

An analysis is made of the relation of the death rate to density of population, which shows that there was a difference of 2.7 per 1000 in 1889 in favor of the rural counties. Compared with the number of those *living* at different periods the death rates for the same age periods were as follows:—

Under 1 year,	211.5 per 1000.
“ 5 “	63.8 “
20-30 “	8.4 “
All others,	16.2 “

Twenty-one persons are reported to have lived 100 years or more, all of whom were white; and 15 were foreign born. The public health on the whole was above the average. But little change in the causes of death is noted. The total number of violent deaths is not increasing, while suicide claims a larger number in this class. The death rate from pulmonary consumption has decreased from 34.8 per 10,000 in 1870 to 27.7 in 1889; from dropsy, from 17.9 to 3.8. On the other hand, there has been an increase in the rate from brain disease from 14.35 to nearly 20; from cancer, from 3.5 to 6.1; from kidney disease, from 10.5 to 30.1; from heart disease, from 6.60 to 15.08. As a critic notes, “a great part of these changes come from diagnosis and improved registration; but still the figures are, to an extent, significant both of the change in the character of our population and in the habits of living.”

Statistics of divorce are included, of which an abstract will be given hereafter.

Twelfth Annual Report of the State Board of Health of Rhode Island for the Year 1889, and including the Report upon the Registration of Births, Marriages, and Deaths in 1888. Providence. 1890.

This is one of the best state registration reports in the United States, as the system of registration is thorough and complete. The report might be made more valuable by the addition of a summary table, showing in one table the birth, death, and marriage rate per 1000 for a series of years. The death rate since 1860 is given satisfactorily on page 121, annually and with averages for five-year periods; the marriage rate is given on page 101 with no five-year averages included; while the birth rate on page 78 is calculated as "of population one birth in every;" and the return does not go back of 1869. We have none too many reliable bureaus of vital statistics, and those that we have should take pains to give us in every issue all the wealth they have. While there are advantages in calculating the birth rate as done in this report, for purposes of comparison much time will be saved to the student of such phenomena by furnishing the other. If the report were not generally so good and complete, this suggestion would not be prompted, as vital statistics of any sort are by no means abundant in this country.

There is little change in the birth rate of Rhode Island. In 1869 there was one birth to every 41.4 of population; in 1888, one to every 41.1. Between 1870 and 1878 there was a gain, but since the latter date it has fluctuated around 41. Several tables and analyses show that for Rhode Island at least the season of the year does not have any considerable influence in the causation of birth. There has been a constant increase in the number of children of foreign parentage. In the five years 1858-62, the percentage of births of American parentage was 48.50; in 1888 it was but 38.62. It is shown that there are more foreign mothers married to American fathers than American-born mothers intermarrying with fathers of foreign parentage. It is somewhat surprising to note that the number of mothers who have ten or more children, though small, has, nevertheless, increased since 1883. There is no table of illegitimate births for a series of years.

The marriage rate increased but little in the period 1883-88. There was an increase of about one year in the average age of the males who were married during the ten years 1879-88 over the average

age of the males married in the previous decade; while the average age of brides increased about one and one-half years.

The death rate, as reported, is increasing. For different periods it is as follows:—

	Per 1000.		Per 1000.
1860-1864,	16.5	1885,	17.7
1865-1869,	16.5	1886,	18.8
1870-1874,	17.2	1887,	19.9
1875-1879,	16.6	1888,	20.4
1880-1884,	18.0		

There is an interesting table showing the average age of all decedents. This, it will be noticed, has increased.

Average Age.		Average Age.	
1860-1864,	29.71	1875-1879,	31.29
1865-1869,	31.58	1880-1884,	33.24
1870-1874,	30.80	1885-1888,	33.75

The average age of females is from two to four years greater than that of males in the several years. This report has separate calculations of the vital statistics of colored persons.

Twenty-second Annual Report of Births, Marriages, and Deaths in Michigan for the Year ending 1888. Lansing, 1890. Pp. viii, 260.

A great defect in the basis of this report is the incomplete registration of births, marriages, and deaths, and the necessity for correcting the first returns by such additions as may be afterwards obtained. For example, the number of births in 1885, as originally returned, were 42,119; this estimate has since been increased by corrections to 58,026. It appears that from 70 to 80 per cent of what is estimated as the true number of births is returned. The same degree of discrepancy exists in other years, and in the returns of marriages and deaths. In spite of this fundamental uncertainty, which the Secretary of State frankly states, various tables and elaborate calculations are made which do credit to the spirit and will of the office, even if certain data cannot be dealt with.

The birth rate for 1888 is calculated at 26.5 per 1000. As in Massachusetts, the largest proportion of births took place in the last six months of the year. The number of children born of native-born parents was 44.01 per cent of the whole number. The number of illegitimate births increased in the period 1885-88, which is attri-

buted, however, to a more complete registration. According to the returns, 12.07 in every 1000 births in 1888 were illegitimate.

The marriage rate was 9.3 marriages to 1000 of the population, which probably indicates a fair degree of completeness of registration. The average age of the bridegrooms was 29.20 and of the brides 24.43. This is about one year increase on the average age for the previous ten years. The number of deaths exceeded that of any other year, but this did not signify "an unsatisfactory state of public health but a more perfect registration in some parts of the state, and more especially in Detroit." The author of the report admits that, on account of the imperfections in the registration, it is impossible to form a correct idea of the death rate of the state. There are some other suggestive statistics showing the comparative healthfulness of different pursuits.

Fourth Annual Report of the State Board of Health of Ohio for the Year ending October 31, 1889. Columbus. 1889. Pp. 350.

There is but little comprehensive collection of vital statistics in Ohio. It is stated that through the local boards of health a system of weekly reports of preventable diseases is being completed, and it is hoped that by another year comparatively accurate statistics of the prevalence of such diseases among urban populations may be furnished. The weekly reports of correspondents of the more fatal diseases of childhood include the practice of about two per cent of the physicians of the entire state. The monthly health bulletins are reprinted; and a considerable amount of meteorological statistics is appended. From the summary of the mortality statistics it is computed that in the towns reporting, representing a population of 1,197,840, the death rate was 14.16 per 1000.

Fourth Annual Report of the State Board of Health and Vital Statistics of Pennsylvania. Harrisburgh. 1889. Pp. 1200.

The statistical parts of this report embrace statements of Boards of Health of Scranton, Philadelphia, and Erie. There are marriage statistics and meteorological tables for the whole state. Pennsylvania has but lately taken up the work of registration. At present only registration of marriages and physicians is provided for by law. The return of marriages, however, is so incomplete that, as the report says, "nothing more than a few partial deductions can be made from it." No state record is yet made of births and deaths.

Eleventh Biennial Report of the State Board of Health of California for the two years ending June 30, 1890. Sacramento. 1890. Pp. 284.

The registration law of California is very imperfect. Births are not returned or recorded except in a very few instances. It is calculated that returns of mortality are received for nearly two-thirds of the state, and upon that basis the death rate is estimated at about 15 per 1000. Statistics of deaths as far as reported are tabulated, and illustrate the distribution of disease and its character. There is an interesting statistical paper on *Leprosy*, by the President of the Board of Health.

Fifth Annual Report of the State Board of Health of Maine for 1889. Augusta. 1890. Pp. xvi, 304.

The Secretary deplores the fact that any statistics that can be presented for Maine in regard to the health of the state are of very slight value. The suggestion is therefore made that the legislature enact a law for the registration of vital statistics.

The Secretary of the North Carolina Board of Health, in the *Bulletin* for February, states that the board is still unsuccessful in gathering statistics. In their last report all that they were able to report was the number of deaths, with causes, in only ten or twelve towns, and even in these towns there were only a few from which the reports were received every month during the two years. A continued attempt will be made by appealing to the mayors.

Medical Education, Medical Colleges, and the Regulation and Practice of Medicine in the United States and Canada. 1765-1891. By John H. Rauch, M.D., Secretary Illinois State Board of Health. Springfield. 1891. Pp. 222.

This is the Seventh Report of Medical Education made by the Illinois Board of Health, the first appearing in 1880. This issue also includes a valuable summary in regard to medical education in foreign countries. The work is statistical in its character, and annually grows in completeness and accuracy. There are now 135 medical colleges in the United States and 13 in Canada. An object of the report is to indicate the development of the practice of requiring education qualifications for matriculation. The statistics show a marked increase in the standard. Of 1183 graduates from various medical colleges of the United States who have been examined by the state boards of Alabama, Minnesota, New Jersey, North Carolina, South Carolina,

and Virginia, 285, or 24 per cent, have been rejected. The total number of graduates and the percentages of graduates to matriculates, from 1880 to 1890, was as follows:—

Year.	Number of Graduates.	Percentage to Matriculate.
1881	3,965	32.7
1882	4,571	35.8
1883	4,215	33.0
1884	4,091	32.8
1885	3,824	33.2
1886	4,043	33.8
1887	3,835	30.6
1888	4,142	30.3
1889	4,543	31.0
1890	4,863	30.1

A Manual of Public Health. By H. Wynter Blyth. London. 1890. Pp. 23, 653.

The first section of this work, pp. 1-44, deals with vital statistics. Its scope is indicated by the following topics: method of calculating population between the census periods by logarithms; calculation of birth and death rates; age distribution; mean age at death; mean duration of life; probable duration of life; construction of life tables; aids to calculations, such as tables, Fuller's spiral rule, and the arithmometer. It is exceedingly practical in its treatment.

DAVIS R. DEWEY.

The Minister of Commerce and Industry of France has recently asked of the Conseil Supérieur de Statistique advice upon the compilation of tables of morbidity for different professions. At the same time the Commission Supérieure des Sociétés de Secours Mutuels, feeling the need for these tables, instituted an inquiry into the best means of obtaining them. Commissioned to make a report on this subject, M. Jacques Bertillon has made a special study of the principal tables of morbidity now existing, and has just given the results of this study in a recent article in the November number of the *Revue d'Hygiène*.

M. Bertillon first states that the statistics of morbidity give most varying results, due to the differences in ideas as to what constitutes a malady. Some do not count mild diseases of a few days' duration, while others omit chronic maladies, so-called.

The only statistics which are comparable are the military tables, for here the definition of sickness for a soldier (incapacity for service) must necessarily be the same in all countries.

According to Bertillon's tables there are in all the armies of Europe each day from 40 to 50 patients per 1000 men. Each soldier has, on an average, 16 or 17 days in the year when he is incapable of doing work. In spite of the difference in rules there is a remarkable agreement between the armies of the different countries, because here the conditions remain invariably the same when the term sickness is given. In spite of the difficulty of arriving at any general conclusions upon this subject, M. Bertillon has been able to make the two following points:—

1st. That morbidity and the death rate are less in the country than in the small cities, and less in the latter than in the large cities.

2nd. That adult women are more liable to sickness than men.

This last conclusion results clearly from observations made among the Lyonnaise work people, in a community where the women are very numerous; and also in Italian communities. He sums it up by saying that, up to the age of forty-five or thereabouts, the number of sick women is equal to one and a half times that of the sick men. Above this age the difference diminishes little by little.

G. N. C.

STATISTICAL YEAR-BOOK OF URUGUAY.

Anuario Estadístico de la República Oriental del Uruguay 1889.
Montevideo. 1890. Pp. lxxvii, 727.

This is a yearly publication containing valuable information. It is divided into fourteen chapters, with an introductory note addressed to the Secretary of the Treasury, and an appendix on the immigration laws. The subjects treated in these fourteen chapters are: 1, Territory, historical and geographical sketches, climatology, and meteorology; 2, Population, immigration, birth, and mortality, accompanied by statistical tables; 3, Foreign trade; 4, Home trade; 5, Navigation; 6, Treasury; 7, Public wealth; 8, Stock exchange, prices of staple products, banks, and insurance companies; 9, Public education; 10, Public charities, hospitals, and asylums; 11, Justice, prisons, and police; 12, Railways; 13, Post-office, telegraph, and telephone; 14, Legislation, administration, and other data.

The total population of the country is 683,943. This estimate, however, is not obtained by a regular census, but by means of rough calculation. The tables show there has been a continuous increase from 1879 to 1889, attaining its maximum in the latter year, when the rate of increase over 1879 was 56 per cent. Of the 683,943 inhabitants 222,049 live at Montevideo. The density of the population for the whole country is 3.66 per square kilometer.

In 1879 the total trade of Uruguay amounted to 62,777,970 pesos. Of this 36,823,863 was due to importation, and the remaining 25,954,107 to exportation. England and France contribute most to the Uruguayan trade. The United States imported from Uruguay in the same year 5.55 per cent, and exported to her 9.26 per cent.

The national revenue of the financial year, 1888-89, was 15,690,293 pesos, showing an increase of 2,022,197 pesos over the previous year. Of this increase 998,449 was caused by custom duties.

The total public debt of the Republic amounts to 81,279,752 pesos. The customs revenue amounted to 10,786,602 pesos, or a little more than two-thirds of the total national revenue. Nearly all of this, or 10,362,432 pesos, was collected in the port of Montevideo, where is centred the whole trade.

The tables in the chapter on Public Education show that there were 412 public schools in 1889, 32 more than in the preceding year. Besides these there is a University, a Military School, and a School of Arts and Manual Training. The University is attended by 692 students. Besides the public schools there are 402 private schools attended by 21,017 students.

There are 756 kilometers of railway already built, 801 in construction, and 2130 in project. There are 4038 kilometers of telegraphic lines, 316 of cable, and 2700 miles of telephone.

The number of births for the year 1889 was 7860. Of the legitimates 3523 were male and 3483 female. The illegitimates were 854,—males 459 and females 395. The number of births, 7860, shows an increase of 781 over the year 1888.

The data on marriages are valuable in showing the influence of the foreign element in Uruguay. There were 3072 marriages in 1889. Of the contracting parties the bridegrooms numbered 476 Uruguayans and 1060 foreigners, while the brides numbered 775 Uruguayan and 761 foreign. Of the foreign nationalities, those most represented were Italians, 494 males and 317 females; Spaniards, 366 males and

280 females; French, 80 males and 71 females; and Argentines, 39 males and 51 females. Of the 1536 females who contracted marriage, 253 in 1889, and 218 in 1888, were below 18 years of age. But the favorite maritable age for the female appears to be between 20 and 25. For the bridegrooms between 25 and 30 years is the favorite period.

There were, in 1889, 5061 deaths, thus distributed: 3327 Uruguayans, 1731 foreigners, and 3 of unknown nationality. The diseases which caused greatest mortality were: consumption, 978; diseases of digestive organs (liver, etc.), 773; of circulatory organs (heart, etc.), 527; of respiratory organs (pneumonia, etc.), 433; tetanus and convulsions, 401; and cerebral and spinal diseases, 350. The climate of Uruguay is not subject to epidemics. Among ascertained causes of violent deaths there are 35 homicides, 5 suicides in 1888 and none in 1889; drowning, 45; fractures, 33; and poisoning, 12.

The report is thorough, attractive in appearance, and throughout is illustrated with valuable tables of graphic statistics. It also contains a fine collection of photogravures of the President and his Cabinet, and of the principal buildings and streets of Montevideo; and an excellent map of the country showing the railway, telegraph, and cable lines.

R. R. DE CARVALHO.

REPORT OF THE COMPTROLLER OF THE CURRENCY.

Annual Report of the Comptroller of the Currency, December 1, 1890.
Edward S. Lacey, Comptroller. Washington. 1890. Pp. 307.

In addition to the topics regularly considered in the report of the Comptroller of the Currency the present issue treats of two subjects of special interest,—the nature and volume of substitutes employed for money, and, secondly, the character of domestic exchanges. A successful attempt has once more been made to ascertain the extent of the use made of substitutes for money in banking operations in the United States. This is in line with two similar returns, one in 1871, confined, however, to only 52 banks, and the other in 1881. In 1871 the 52 typical banks were ordered to analyze all their receipts for six consecutive days, and from this it was determined that 12 per cent of the receipts were in cash (coin, greenbacks, bank notes, or coupons),

and 88 per cent in checks, drafts, and commercial bills. The returns for September 17, 1881, and September 17, 1890, are presented in the following table:—

United States.	Sept. 17, 1881. 2132 Banks.		Sept. 17, 1890. 3474 Banks.	
		<i>Per cent.</i>		<i>Per cent.</i>
Gold Coin.....	\$4,078,044	1.38	\$3,702,772	1.13
Silver Coin.....	500,302	.17	1,399,991	.43
Paper Currency.....	12,881,571	4.36	24,210,463	7.40
Checks, Drafts, etc.,.....	277,773,862	94.09	297,965,025	91.04

The Comptroller presents similar tables for New York City alone, the other reserve cities and the towns inside the reserve cities, and discusses the possible causes which have led to a decrease in the use of checks and drafts as compared with 1881. It should be added that in both years another day, June 30, in addition to September 17, was taken, but the returns are quite similar for the two dates in each year.

The statistics showing the amount of drafts drawn by the national banks in each reserve city, and in each state outside the reserve cities, upon New York, Chicago, St. Louis, and other reserve cities, and all other banks, are the first which have ever been published. Out of \$11,550,898,255, drawn by all banks during the year ended June 30, 1890, \$7,284,982,634, or 63 per cent, was drawn upon New York. In addition to the drafts drawn by national banks, other drafts are estimated as follows:—

3229 national banks (official)	\$11,550,898,255
109 " " (estimated)	287,334,573
3878 state banks, private, etc. (estimated)	6,089,291,932
Total,	\$17,927,524,760

A table is also presented showing the amount of premium charged on each \$100 for each state. The average rate was $8\frac{1}{2}$ cents.

MUNICIPAL FINANCE.

Third Annual Report of the Executive Committee of the Citizens Association of Boston. 1891. Pp. 80.

Contains a considerable amount of data and statistics in regard to expenditures of the Boston municipal government, compared in many

instances with other cities. There is a suggestive treatment of the necessity of consolidating different departments, of revising the city charter, proper regulation and control of electric wires, and of the need of reforming the present form of department reports. Criticism upon the last point is sharp and intelligent. The Report notes the confusion in accounts that is caused by "the multiplicity of independent departments, the difference between the municipal and financial year, and the unsatisfactory method in which the books of the several departments are made up."

"Such a condition of things is in marked contrast to the reports issued by similar departments in other cities. In Philadelphia, for instance, the report issued by the Bureau of Highways, under charge of the Director of Public Works, is filled with the most minute, satisfactory, and clear statements in regard to the amount and variety of each class of work done by the department, the exact cost of that work determined by the square feet of surface, cubic capacity, or running length in feet or miles. The prices paid for all materials are stated so they can be understood; the prices are given at which contract work has been done, and any citizen who can read can tell in three minutes, by an examination of their report, how much money the department has spent, what it has been spent for in detail, and just how much was accomplished by that expenditure; how the amount of work for each year compares with the work and expenditures of previous years; the total mileage of streets; the total amount of each kind of pavement in the whole city each year; and other facts not only of interest but of importance as enabling the citizens who desire to know, and possibly to criticize the actions of their public servants, to do so with a full and accurate knowledge of the official acts of the departments."

Bulletin Annuel des Finances des Grandes Villes. Dixième Année: 1886. By Joseph Körösi, Budapest. 1890. Pp. 93.

In September, 1889 (Vol. I, p. 336), of the *Publications*, a notice is given of the eighth issue of this annual series. At that time there was a possibility that the series would be discontinued, but all students of municipal finance will be glad to see this additional issue. Mr. Körösi, however, announces that this is the last which will appear under his direction. Hereafter the Statistics of Finance will be under the direction of Prof. J. Jahnson, Director of Municipal Statistics at

St. Petersburg, and the Mortality Statistics under Dr. J. Bertillon, Chief of the Statistical Bureau of Paris. The former of these will probably not be issued as frequently as hitherto. To Mr. Körösi, for his laborious pioneer work, is due great credit and the thanks of all investigators and students in this field. The following tables are given: Receipts of municipalities; extraordinary receipts, expenses; direct and indirect taxes; expenses of police; cleaning streets; lighting; fire departments; schools; public charity; streets; constructing new streets; interest on and funding the debt, and pensions. In every case the per capita computation is given. In addition, totals are given with notes and remarks.

PRICE STATISTICS.

In its issue of Jan. 3 1891, the *London Economist* exhibits the movement in the price of commodities and compares the "index number" in December of successive years. The figures are:—

December, 1885,	2023
" 1886,	2059
" 1887,	2230
" 1888,	2187
" 1889,	2248
" 1890,	2241

The general level of price therefore is seen to be but slightly lower at the close of the year than at the beginning. There is a decline in prices of raw material for textile manufactures, and a rise in the prices of food products, including tea and coffee.

In a statistical pamphlet entitled *Our Commercial Barometer for the year 1890* (Imperial Federation League. London. 1891. Pp. 44), Sir Rawson W. Rawson, after analyzing the commercial changes, month by month, for Great Britain, discusses the value of the calculation of average prices drawn from the tonnage of vessels entering and clearing with cargoes, and the total value of imports and exports. He also submits a table showing the fluctuation of prices by an index number since 1881. His method differs from that of Mr. Sauerbeck in embracing in his estimate a far larger number of commodities. Mr. Sauerbeck derives his index numbers from the average prices of 45

principal commodities. The comparison of the two series of index numbers is seen in the following table:—

Years.	Sauerbeck.	Rawson.	Sauerbeck.	Rawson.
1867-77	100	100	Annual Increase or Decrease.	
1881	85	83	....	....
1882	84	81	—1	—2
1883	82	78	—2	—3
1884	76	76	—6	—2
1885	72	69	—4	—7
1886	69	68	—3	—1
1887	68	68	—1	Nil
1888	70	69	+2	+1
1889	72	71	+2	+2
1890	72	71	Nil	Nil

MINOR NOTICES.

Three Papers read before the Australasian Association for the Advancement of Science. By Henry Heyleyn Hayter, Government Statist of Victoria. Melbourne. 1890. Pp. 37.

The subjects of these papers are Official Statistics (1888); The Coming Towns (1890); and Our Meat Supply (1890). In Mr. Hayter's opinion, no more than five days should ever be allowed to the taking of a census; nor should more than five years elapse between two censuses. After a discussion of the nature of the different schedules, criticism is made of the returns of the state revenue and expenditure. In Australia it appears that "refunds, drawbacks, advances to be recouped and recoups of such advances are mixed up with the statements, so that both revenue and expenditure appear to be much larger than they really are." A protest is entered against all such cross entries. It is also asserted that the customs returns of imports are considerably overstated. It appears to be difficult to ascertain the actual rate of interest Australia is paying for borrowed money. Criticism is offered of the emigration statistics, as well as of the registration of births.

Upon the subject of *Meat Supply* the author opposes the view that there is any danger of a lack in the supply of meat. Mr. Coghlan,

the Government Statist of New South Wales, had recently published some calculations to show that the demand for beef would probably overtake the supply in six years. This, Mr. Hayter regards as unwarranted,—Mr. Coghlan's error arising from assuming a too large rate of increase of the population. Mr. Hayter indeed believes that it is impossible to place any limit on the quantity of live stock that Australia may ultimately be able to carry.

Report on the Beef Supply of the United States, and the Export Trade in Animals and Meat Products. By Dr. D. E. Salmon. United States Department of Agriculture. 1890. Pp. 15.

It is difficult to make a census of large cattle, but in 1888 a special effort was made to obtain reliable data from the western states. The statistics given as a result of this inquiry are regarded as the most accurate yet presented. From them the author calculates that cattle as to every 1000 of the population throughout the United States have numbered as follows:—

1850	767	1884	787
1860	815	1885	800
1870	618	1886	794
1880	738	1887	788
1881	744	1888	771
1882	758	1889	758
1883	773		

The decrease since 1885 is in a measure to be accounted for by overestimating the population which was estimated at 65,172 000 in 1889. Tables also show the number of milch cows; price of hogs and steers in Chicago, and statistics of the export trade.

Abandoned Farms in Massachusetts. (From the *Twenty-first Annual Report of the Massachusetts Bureau of Statistics of Labor.*) By Horace G. Wadlin. Boston. 1891. Pp. 177-258.

Since the recent interest manifested in the question of "abandoned farms" in several of the New England states, this is the most systematic and complete attempt to get at the facts of the problem. The returns are given for the entire state, excepting the cities and six towns, and were made by the assessors of the towns in 1889-90. "By abandoned farms are meant those formerly cultivated but now deserted, upon which cultivation is now abandoned, and the buildings, if any, unoccupied and permitted to fall into decay. In some cases the grass is still cut, but nothing is done in the way of enrichment of the soil."

Answering such a description, there are 1461 farms with an acreage of 126,509, valued at \$1,076,328. A considerable part of this value is represented by buildings. The proportion of land abandoned to the acreage of all farms is 3.45 per cent, while the value is but 1.15 per cent of the value of all farm land. The average size of the abandoned farms with buildings is 86 acres, and of those without buildings is 87. With this desertion of land it is shown that there has been no falling off in recent years in the aggregate value of agricultural property, or in the value of agricultural products. Of the 144 towns reporting abandoned farms 86 show a decline in population. In some cases the desertion of agricultural land is simply a symptom that the town is in a transition from a purely agricultural to a manufacturing basis. A comparison is made of tax rates in towns with abandoned farms, and the report closes with a discussion of the causes for abandonment.

Shoe and Leather Reporter Annual for 1891. Boston. Pp. 701.

Contains statistics of distribution of shoes from Boston, by which the consumption of shoes in different localities is in a measure indicated; export of leather goods, with detailed statements for each country; imports; hide and skin supply, as well as statistics of prices, etc. It concludes with a full directory of shoe houses.

Maps of the United States showing the Central Station Plants of Electric Railways and System in Operation. Thomson-Houston Electric Company. Boston. 1891. Pp. 110.

Outline maps of each state are given, with symbols located upon them to indicate the nature of the electric plant employed in the several towns where electricity is used. There are two series of maps, one for electric lighting and another for railways. It is stated that the maps have been prepared from data collected from original sources, by a thoroughly disinterested man, whose sole object has been to locate correctly every city or town having a central station. It appears that there are 240 electric railways in the United States, and about 2000 central electric lighting stations. The maps are very clear.

At a recent general convention, at New Orleans, of the National Board of Trade, representing Boards of Trade and kindred Commercial Organizations from the different states, the following resolutions were unanimously adopted:—

Resolved, That the National Board of Trade recommends to Congress the revision of the present census and statistical legislation, and the immediate provision for future enumerations, with a view to better service and greater efficiency.

Resolved, That a committee be appointed to draft a bill and present the same to Congress, contemplating permanence of statistical and enumerating officials and a proper separation of the times in which enumeration of the population required by the Constitution and the collection of general statistical information is made.

At the last meeting of the American Economic Association, held Dec., 1890, at Washington, Mr. Allen R. Foote introduced the following resolutions:—

“Resolved, first, That a committee be appointed to designate the division of accounts, and the items to be included in each, that should be kept by corporations performing quasi-public services.

“Resolved, second, That said divisions be so made that the effect of each essential economic factor will be shown, to the end that correct statistics may be obtained through a uniform method of accounting, as a basis for intelligent economic discussion and legislation.”

These resolutions were introduced with the view of securing a more satisfactory basis for the discussion of the question of municipal ownership of electric and gas-lighting plants.

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A BASIS FOR STATISTICS OF COST OF PRODUCTION.

BY CARROLL D. WRIGHT,

UNITED STATES COMMISSIONER OF LABOR.

One of the most difficult features of statistical work is the adoption of a basis for the collection of the information desired. Such a basis should always comprehend the full scope of the inquiry, or, as the scientific statistician would term it, the "theory," underlying the investigation; that is to say, the basis adopted should be broad enough and specific enough in its details to comprehend all that might be reasonably expected to result from a statistical inquiry on a special subject. The basis should also be considered with a view to the presentation in proper form of the facts collected. Should this latter feature be lost sight of in the preliminary work of an investigation, much difficulty would be experienced in the compilation of the original data. The official statistician who is instructed by the legislative power to collect information on a great subject must make a pretty thorough study of the possibilities of securing information and of the obstacles to be overcome in prosecuting his inquiries. Probably

no severer test of the feasibility, at least of collecting original information, has been made than that accompanying the investigation now about completed by the United States Department of Labor on the cost of production. I am not aware that any government has ever required so difficult a task at the hands of its statistical forces as that comprehended in the instructions of Congress to the Department of Labor in the act establishing the Department. This act charged the Commissioner of Labor to ascertain, at as early a date as possible, and whenever industrial changes shall make it essential, the cost of producing articles at the time dutiable in the United States in leading countries where such articles are produced, by fully specified units of production, and under a classification showing the different elements of cost or approximate cost of such articles of production, including the wages paid in such industries per day, week, month, or year, or by the piece, and the hours employed per day, and the profits of the manufacturers and producers of such articles, and the comparative cost of living and the kind of living. As I have intimated, I know of no statistical task required of an office severer than this required by Congress. There may be one exception,—when the Congress required of the Census Office the collection of facts relating to mortgage indebtedness. It will be seen by the language of the law which I have quoted that the object was to secure a comprehensive collection of information which should show the cost of producing articles in different countries, the efficiency of the labor engaged in their production, and the cost of the living of the producers, as well as the kind of their living. Of course, under such a broad designation of duties, the first difficulty that would arise would be the formulation of the proper inquiries necessary to secure the specified information. The advice of producers in various industries, experienced men and experts in their particular lines, was freely sought and as freely given, the result being a series of schedules, scientific in their nature, which would

result, if properly filled, in securing the desired information. After the fullest consideration of the instructions of Congress and consultation with manufacturers and experts in different industries and from different parts of the country, it was determined to make the investigation as broad as possible, so that the study of the cost of production in such industries as might be selected should be searching and analytical. To do this it was of course necessary that the information collected should be upon a uniform basis, so far as each industry was concerned, and, in fact, so far as the bulk of the industries investigated were concerned. It will be understood at once that but few industries could be covered under the instructions of Congress. To ascertain the cost of production, there must be a clearly defined unit of production; so, the industries selected were selected with this feature in view, consideration also being taken as to the volume of revenue which the importation of each article bore to the whole revenue of the country. The industries selected, which seemed to offer the opportunities for investigation on well defined units, were all the textile industries, glass and glassware, iron ore, iron, steel, etc. These industries, through the importation of articles manufactured in the various branches of these industries, produced, for the year ending June 30, 1889, about 47 per cent of the revenue of the country.

The investigation assumed three great features or divisions, the first relating to the cost of producing the articles selected, which, as I have said, must necessarily be articles having definite and equal units, such as a ton of bessemer pig iron, rather than a steam engine or a mowing machine; the second feature covering rates of wages, time, earnings, and the efficiency of the labor connected with the establishments furnishing the information on the cost of production; the third feature being the collection of facts covering the cost of living, total earnings, and expenditures of the men employed in the establishments called upon to furnish data relative to the cost of production, earnings, and efficiency.

The facts under the first feature were to be taken from the account books of the establishments producing the goods; for the second (wages, time, etc.) from the actual pay rolls or pay accounts of such establishments, while all facts relating to the cost of living and expenditures of men and their families were to be gathered from the men themselves. I am exceedingly happy to state that this wide and comprehensive plan, as originally adopted, has been carried out relative to the great industries named, and to an extent and with a success far beyond my expectations when it was adopted. I am free to say, however, that the results of this great inquiry, as must be the case in all other investigations, do not reach the statistical ideal of the collection and presentation of important facts; but the result can honestly be designated a "statistical triumph," in securing which many intelligent, fearless, and well informed manufacturers have been willing, for the benefit of the public, to give all the facts called for relative to their business. It is an exceedingly delicate matter to ask a manufacturer to give all the facts and figures relating to the cost of producing his goods, but manufacturers, like other people, are becoming familiar with the idea of governmental inquiry into conditions, and are more and more convinced that not only does no harm come to them from an honest statement of the facts sought, but, on the contrary, that great good may be derived from such statements. Of course, not every manufacturer who was asked to furnish the information called for by the Government accepted the invitation; but in the iron and steel, coal and coke industries the proprietors of 618 establishments in this and other countries responded and contributed facts necessary for a fairly complete report on the subject, while in the textile and glass industries the proprietors of more than 250 establishments have furnished full information covering more than 1000 separate units.

The methods adopted aided the prosecution of the investigation to a very large degree. Experts and agents were

sent directly to the producers. The difficulties met with by the American Iron and Steel Association, as testified to by the secretary of that body, as involved in making a reply to the Honorable Secretary of the Treasury as to the cost of producing iron and steel, taught the Department something, and induced it to rely upon the methods which I have always found most effective. This method may be called the "personal" method, that of sending experts and agents directly to the producer, as I have said. The experience of the Association referred to, and of all statistical bureaus engaged in the collection of industrial statistics, has for many years condemned the correspondence method of collecting facts. It has, with rare exceptions, been a failure. The personal method, that of sending well informed and well instructed agents to obtain in person what is wanted, and to fill the schedules themselves from the books of account, is the only one that will secure satisfactory results. The great merit of this latter method is that a well informed man on the spot can answer all objections and show clearly all advantages.

What I have said relates entirely to the comprehensiveness of the work delegated by Congress to the Department of Labor in respect to cost of production and the general plan of carrying out the legislative requirements. It has been difficult enough in prosecution, but the difficulties were not ended with the laying out of the plan or even with carrying it out. The great question which had to be taken into consideration, and which involved more than statistical skill or ingenuity, related to the economic features of the investigation; so the question, What is meant by cost of production? had to be answered, and in such a way as to enable the Department to present its facts. The essayist, the writer on political economy, can answer such a question without any difficulty whatever, because he has simply to arbitrarily determine what he considers cost of production, and then argue to that end. The statistician is obliged to answer the question as a practical matter. He must determine what elements

should enter into the answer; and so whatever was determined as meaning the cost of production determined the basis for statistics of cost of production. I believe I recognize and appreciate the purely economic discussion of what is meant by the term, "cost of production," and the economic sense of the term, in its various features, has been very well stated by Prof. Giddings, of Bryn Mawr College. Without adhering closely to Prof. Giddings's language, I will give his general view of the subject. The term, "cost of production," is used with at least four different meanings in economic discussions.

First. The fatigue or irksomeness of labor. All those engaged in extractive industries are fully conscious of this particular meaning of cost of production. The effort and weariness of the farmer counts with him for the cost of this or that farm operation. Prof. Cairnes insisted that in economic theory cost of production must always mean fatigue of muscle and of brain. He considered wages, interest, etc., as the rewards of production.

Second. Cost of production may mean the destruction of one objective or material utility in the production of other utilities. One manufacture destroys the products of another industry. We destroy seed, grain, fertilizers, etc., in producing agricultural crops, and we destroy coal to produce steam power. Prof. Giddings says we have to use "cost" in this sense whenever we inquire whether a nation is increasing its material means of satisfaction by the ways in which it consumes its resources. This is a very true statement. The production of iron and steel means the destruction and consumption of the great sources of ore, coal, etc.

Third. By the cost of production we may mean the sacrifice of an opportunity or of a value, or, as Prof. Giddings very forcibly illustrates it, the blacksmith might be able to make \$1.50 a day as an agricultural laborer, when any other man in the neighborhood could make but \$1.25; but, being able as a smith to make \$2.00 a day, he stays at

his forge. He will estimate the cost of production of his work at the value of his best alternative employment,—the \$1.50 a day. It is in this sense, the Professor says, we constantly use the word cost in discussions of international trade. Thus a nation that could produce iron at \$11 a ton may import it at \$13, simply because the labor and capital that would produce a ton of iron at \$11 may be productive of enough wheat or cotton to buy a ton and a half or two tons at \$13.

Fourth. Cost may mean the sum of all the prices paid for the materials and labor and sacrifices involved in production, and this is what the business man ordinarily means by cost of production,—that is, the expense of production. And it is in this sense, or in considering this sense, that the statistician must project his basis for securing and presenting the statistics of cost of production. It should be understood, to again quote Prof. Giddings,—not literally, but generally,—that cost in this latter sense is not always a *cause* of value or price; that is, the price of a product is not necessarily determined by its cost of production in the terms of the prices of labor and materials; on the contrary, the price of the final product may determine how much the producer will offer for materials and labor. The difficulties often experienced in economic discussions of determining exactly the relations of cause and effect hold good in this matter. More than one final product is commonly made from the same raw material, and the prices of those products, even after allowing for all other differences in expenses, may be very unequal. Nevertheless, the various producers will buy their raw material at substantially the same price, and that price cannot exceed the market value of the least valuable product made from the material. This is not always so in practice, but it is true theoretically. So, therefore, it is the least valuable product which largely determines the cost of production for all other products made from the same raw material, or by substantially the same kind of labor.

Recognizing these different meanings of the term, cost of production, it is evident that only a few of them, and to a certain extent, can enter into the statistical basis, and these elements of a basis must comprehend the expenses of production, the cost of production as expressed by the consumption of time, and the cost of production as expressed by the destruction of the resources furnished by nature. Not only economically speaking, but practically, these three features should enter in as the great elements of any comprehensive basis for statistics of cost of production. The other elements which I have referred to can hardly be comprehended by statistical inquiries, although all-important in any complete analysis of the cost of production.

In the investigation under review, therefore, cost of production has been stated in the three ways just enumerated, — the expense of production, the cost as determined by the consumption of time, that is of labor, and the cost as determined by the destruction of natural elements. But this is not sufficient; this is a statement of a conclusion. How shall we arrive at a basis on which to collect and present facts showing the expense of production? It is in this particular feature that all discussion would properly arise as to any determination for a basis. An examination of the elements of destruction of raw material, like iron ore, etc., is a simple affair, on which there can be no discussion; the consumption of time, or the destruction of the labor of man, is a simple matter, on which there can be no discussion by economists or business men; but when we come to what constitutes the expense of production, that is, the business view of the cost of production, there is opened a wide field for discussion, and one which will involve the integrity of any basis for the collection and presentation of statistics of cost of production.

In the report resulting from the investigation to which I have referred, and as ordered by Congress, the term cost of production has not been used in any technical or metaphysical

sense, although from the facts reported the economic cost of production, as indicated by the waste or consumption of material or of time, can be clearly ascertained. In arriving at the cost of production all expense of interest, insurance, depreciation of the value of plant, and (where existing) royalty to the owners of the soil has been excluded, as have also all charges for freight of product to place of free delivery. The facts upon these points, except the last, have been collected from such manufacturers as have seen fit to give them and have been tabulated separately, so that anyone who does not agree with the position of the Department of Labor can for himself ascertain what the cost of production would be with these excluded elements added. For the purpose of the investigation it was deemed sufficient to include only those elements of cost which are universal, positive, and absolutely essential, that is, those elements of cost that are common to all producers and which must be borne in order to bring out the completed product.

Interest can hardly be called an element of cost of production because of the variation of the amount of interest which enters into the estimates of concerns. Moreover, an establishment may have no interest money to pay, considering its plant as "sunk," or it has charged off a certain percentage each year for a sufficient number of years to wipe out the entire cost of plant, and so thereafter interest can play no part in the balance sheets or accounts of the concern. The whole amount charged off has been paid out of profits, and could not be reckoned as any part of the cost of producing a single ton. The man who pays a large interest must be content with a smaller profit. If he borrows his capital he reduces his margin of profit. The concern that has completely wiped out the cost of its plant, through a systematic and continued charging off, has the advantage, and its subsequent profits are larger. Some manufacturers in different industries charge, for instance, six per cent on the entire plant to the cost of production, dividing it over

the year's output. In such a case, if the goods are sold at this cost, the manufacturer claims that he has made no profit, when in fact he has made six per cent, and this six per cent offsets the interest he would have obtained for his capital invested in some other direction. He loses his personal services, however; or, to state it differently, he secures six per cent for the care of his capital. Most European producers of iron and steel, and all in America inquired of, have been found to consider their plant sunk to start with, and have advised the Department that the only influence which the value of plant can have upon the cost of production is through charges for repairs, and not through interest added to the positive elements of cost.

The depreciation of value of the plant, which often occupies so much of the attention of writers when speaking of the cost of production, offers a very great stumbling block in any statistical study of the cost of production. In arriving at our conclusions, which resulted in not considering this as a positive and universal element in the cost of production, we have been greatly aided not only by the manufacturers themselves, but by a work on *The Depreciation of Factories and their Valuation*, by Ewing Matheson, M. Inst. C. E., published in London in 1884.

It is true that the cost of repairs should be charged into the cost of production, and it is believed that the full force of the idea that depreciation should enter into the cost of production has in this way been met; that the integrity of the influence of depreciation has been preserved, and without the difficulties which would arise from an attempt to add any sum representing depreciation.

Deterioration of plant by time and use, the appraisement of the loss and its allotment in the accounts, are matters of great importance, of course, in the economy of management; but no fixed rules or rates of depreciation can be established for general use, because not only do trades and processes of manufacture differ, but numerous secondary circumstances

have to be considered in determining the proper course. The question of depreciation cannot be separated from that of maintenance, and in theory one may be said to balance the other. If this be the case, the absolute replacement of some portion of the plant every year may thus maintain an average aggregate value. In only two kinds or classes of plant, however, can such an exact balancing of loss by repairs and renewals be ventured on; one, where the plant wears out so quickly as to need replacement at short intervals, affording constant proof by the mere continuance of working that not only the earning power of the factory is maintained, but also the capital value; and in a second class that of undertakings so large and permanent as to afford a wide average of deterioration and renewal over the whole plant. In the conduct of works there is often a natural tendency to charge off for depreciation in proportion to the profits rather than to the deterioration, and where such a tendency is crystalized into action, the amount charged off being large in a year when the profits are large, the cost of production, should such amount be considered as an element in it, would be thrown out of legitimate proportion.

In the case of a very large plant, where there is considerable annual outlay for renewals as well as for repairs, such expenditure, if charged to profit, may fairly balance the average deterioration of the whole; but to secure this there should be a very ample margin, through the increase of the plant every year, for without this there would be a risk that a gradual lessening of the total value of buildings or plant would take place, ultimately involving considerable expenditure to restore its earning capacity, and this great expenditure, if added to the cost of production, would again distort the legitimate proportions thereof. In the accounts of a plant it is difficult, even for those engaged in its management, always to distinguish between the expenditure for renewals chargeable to capital and that due to deterioration; and to those outside the management it is quite impossible without

careful investigation. Actual additions to the size or capacity of a plant should be largely reckoned as increasing the fixed capital, but such an increase may be wholly or partially neutralized by deterioration. There are various methods of estimating the depreciation of a factory or plant, but it may be said in regard to any of them that the object in view is so to treat the nominal capital in the books of account that it shall always represent as nearly as possible the real value. The most effectual method of securing this would be, if it were feasible, to revalue everything at stated intervals, and to charge off whatever loss such valuations might reveal without regard to any prescribed rate. By such a plan the deterioration due to a period of constant working and of great profits, or to an average or idle year, might be properly allotted.

Such a system is adopted oftenest in factories or works where the trade and plant are of so simple or uniform a kind as to allow it without difficulty. In some manufactories there are a few chief items of plant which are more important than the rest, and whose condition and value therefore need special consideration. But, as a rule, it will be found that charging repairs to cost of production and great extensions or increase of capacity to capital serves the best economic purpose in securing the legitimate cost of production.

In the case of machinery, deterioration depends on so many circumstances, some of which relate to the machine itself, and others to the mode of using it, that it is difficult to establish a just and uniform rate of depreciation which would with integrity be chargeable to the cost of production. Sometimes a machine as a whole may continue serviceable, while important parts may become obsolete. Thus, in an iron rolling mill, new rolls may be cut to produce a certain pattern of bar iron, and if this pattern be of a standard shape and size, constantly in demand, depreciation may be based on its probable durability and the number of tons of iron which the rolls will produce before they are worn out. If, on the other hand, the pattern be peculiar in shape or size, a higher rate

of depreciation is necessary, and it may become proper to charge the whole cost of the rolls to the first out-put of bars. In this latter respect the rolls must be treated like foundry patterns, which are in some cases charged to one set of castings for which they have been specially made, and at another time as stock or standard patterns to capital. There are numerous other industries where a large proportion of the cost of manufacture is for the design and patterns, and a due depreciation in value would become of great importance.

There is a very wide divergence of practice, even in well-managed factories, as to the proper rate of depreciation for machinery. To be on the safe side a concern sometimes commences by charging off annually 10 per cent from the cost of all machinery, especially when the concern is doing a profitable business. In other cases the records of many years' working may show that $2\frac{1}{2}$ per cent is sufficient. In engineering factories the rate which will probably meet the depreciation will generally be found between 5 and 10 per cent. Where the work is of a moderate kind which does not strain the machines severely, and where the hours of working do not average more than sixty per week, 5 per cent would generally suffice for machinery, cranes, and fixed plant of all kinds, excluding steam engines and boilers. Where there is a diversity of machinery and plant, as in a cotton mill, prominent cotton manufacturers, with many years' accounts to enable them to form a correct judgment, have informed the Department that 5 per cent seems to be an appropriate rate to be added to the cost of production when this method is resorted to; but such a rate would be quite insufficient for the machinery of a rolling mill. While a rate of $7\frac{1}{2}$ per cent might be supposed sufficient for the first few years, say four, the valuation at the end of that period might show that some rate between 10 and 20 per cent would be necessary to meet effectually the depreciation in value due to wear and tear, and to the fact that the machinery is likely to become old-fashioned.

Steam engines and boilers, if classed separately from the other machinery of a plant, would generally require a higher rate of depreciation, and a further separation would require that the boilers be given a rate higher than engines. The make of the boilers and engines would have much to do with the depreciation. In trades where steam engines, steam hammers, furnaces, and boilers form a large proportion of the total plant of machinery, they would have to be classed separately from the other machines, or the rate of depreciation for them should determine that for the whole; but it is often considered expedient to exclude from such a general rate of depreciation certain things, such as patterns and foundry boxes, or to class them separately. Where the depreciation is rapid, as in boilers and furnaces, the need for renewal forces itself on the attention of users, and the justice of charging expenditure on this account to profit becomes obvious, and of course to charge such to cost of production would be entirely wrong. From these considerations, and to avoid inharmonies and incongruous elements of cost, we have, to cover all contingencies and the variations of years, included repairs in the cost of production instead of undertaking to determine or accept any specified rates of depreciation by individual concerns.

The charges for insurance cannot justly be considered for statistical purposes as an element of cost of production. It is a variable and often unknown quantity. Many proprietors prefer to carry their own insurance, while others prefer to place their risks with insurance companies. This takes the cost of insurance out of the catalogue of positive and universal elements of the cost of production.

The royalties paid to the owners of the soil in the cases of coal mines, ore mines, or limestone quarries, operated by persons other than the owners, should not be included, because such charges are not positive and universal, and must of necessity correspond to the interest charge of the operator who owns his mine. In other words, the royalty paid by the

lessee represents what would be the interest on capital invested were he the owner, and is not considered as a legitimate charge against cost of production, although affecting profits or selling prices.

The charges for freight of product from the works to place of free delivery should not be included as one of the positive elements of the cost of production, because they are manifestly a part of the cost of selling the finished products, and the plans of an investigation could necessarily carry the product only to the point of finishing at the works. Moreover, such charges are variable, the products of many mills being sold free on board at mills, and of others at such a variety of points that no usable statement could by any possibility be obtained. This latter reason prevented the department from showing among the additional or theoretical charges the comparative advantages of the several establishments in respect to their proximity to market.

Notwithstanding these considerations, there are many students of economic subjects, as already intimated, who regard some one or all of these elements — interest, insurance, depreciation, and royalties — as legitimate elements in arriving at the cost of production, and for that reason a separate tabulation of such data on them as came to hand has been made. It will be found, however, on examining the short tables at the close of this article, that in nearly all cases their influence upon the cost of a unit, like a ton of pig iron or a ton of steel rails, is so slight as not to invalidate the statements made in the tables where they have been excluded.

Another disturbing element in ascertaining exact cost of production is the market price at which materials are charged. A manufacturer of pig iron may also be the producer of the ore or coke, coal, or limestone which he uses, or he may be the producer of some of these materials and a purchaser of others. If he is a purchaser, he is entitled to charge as a legitimate element of cost what he has to pay in the market for the materials, and it sometimes occurs that where a manu-

facturer produces his own ore or other materials, he considers it perfectly legitimate in making up his cost to enter what he produces at the market price he would have to pay for it provided he purchased. This statement will often account for discrepancies in the cost as charged for different materials. The influence of this is more largely felt in the production of steel rails, where the fluctuation of prices of pig iron is great, as shown by the speculation in pig iron in Great Britain. It is extremely difficult to arrive at the specific elements of cost in the production of pig iron in Great Britain on account of the constant gambling there in pig-iron warrants. This species of speculation has been carried to such a reckless extent that a measure has been introduced into Parliament for regulating dealings in pig-iron warrants. The measure aims at such speculative dealings, especially those characteristic of the Glasgow market, where it is no uncommon occurrence for operators to buy and sell enormous lines of warrants without possessing or desiring to possess a single ton of iron. Much harm has certainly at various periods been inflicted on the British iron trade as an industry by the wild gambling carried on by the iron rings, not alone through the destructive operations of bears, but also through the injudicious proceedings of sanguine bulls. The influence of this species of speculation distorts prices and, of course, costs, and it has much to do with the irregularities noticed in the quotations of steel rails. The cost of production is also affected by the freight charges on the assemblage of raw materials, like ore, coal, coke, etc. The cost of transporting ore, for instance, will vary as between two establishments located side by side and bringing their ore from the same mine. One establishment may have influence with the road by which rebates are obtained, while the other establishment, having no such influence, is obliged to pay the full official rates. While such conditions are not frequent, nevertheless, in some cases, they are disturbing elements in the attempt to arrive at exact cost of producing pig iron or steel.

In order to illustrate practically and with figures the influence of what have been designated "theoretical elements" upon the cost of a unit, I have drawn some brief tables from the report on cost of production described above. The following table shows the summary of cost of run of furnace pig iron in twenty-six establishments in the northern district of the United States, meaning by the "northern district" states embracing Pennsylvania, Ohio, and that line of states producing pig iron:—

Elements of Cost.	Tons of 2240 pounds.	
	Cost of 544,377.	Average cost of one.
Ore.....	\$3,787,982	\$6.958
Cinder, scrap, etc.....	313,679	.576
Limestone.....	273,207	.502
Coke.....	1,810,814	3.327
Coal.....	201,940	.371
Total materials.....	6,387,622	11.734
Labor.....	802,283	1.474
Officials and clerks.....	100,607	.184
Supplies and repairs.....	277,413	.510
Taxes.....	19,815	.036
Total.....	7,587,640	13.938

The cost of theoretical elements, consisting of insurance, interest, and depreciation of value of plant, in some of the establishments from which the figures for the foregoing table were taken show an additional cost of \$0.166 per ton, divided as follows: For insurance, \$0.008; for interest, \$0.122; for depreciation of value of plant, \$0.036.

The following table shows the summary of cost of run of furnace pig iron in twenty-four establishments in the southern district of the United States.

A few of the establishments from which the following figures are taken show that insurance would add \$0.006 per ton, interest \$0.096, and depreciation of value of plant \$0.066, or a total for these of \$0.168 per ton. In the northern district it was \$0.166.

Elements of cost.	Tons of 2240 pounds.	
	Cost of 647,728.	Average cost of one.
Ore.....	\$2,245,830	\$3.467
Cinder, scrap, etc.....	10,011	.015
Limestone.....	304,142	.470
Coke.....	2,889,676	4.461
Coal.....	800	.001
Total materials.....	5,450,459	8.414
Labor.....	987,111	1.524
Officials and clerks.....	106,962	.164
Supplies and repairs.....	397,550	.614
Taxes.....	25,372	.039
Total.....	6,966,454	10.755

Turning to the Continent of Europe, the following table, giving positive elements, shows the summary of cost of run of furnace pig iron in one typical establishment on the Continent of Europe, with the summary of cost of theoretical elements added:—

Elements of Cost.	Tons of 2240 pounds.	
	Cost of 33,685.	Average cost of one.
Ore.....	\$154,773	\$4.595
Cinder, scrap, etc.....	67,942	2.017
Limestone.....	13,006	.386
Coke.....	97,028	2.880
Coal.....	238	.007
Total materials.....	332,987	9.885
Labor.....	47,620	1.414
Officials and clerks.....	8,225	.244
Supplies and repairs.....	16,428	.488
Taxes.....	1,321	.039
Total.....	406,581	12.070

SUMMARY OF COST OF THEORETICAL ELEMENTS IN THE ABOVE.

[The establishment covered by this summary reported that it had no insurance, and that there was no expenditure for interest. It gave the amount charged to depreciation, which makes the sum credited to that item below.]

Insurance.....		
Interest.....		
Depreciation of value of plant.....	\$19,846	\$0.589
Total.....	19,846	.589

a From this amount should be deducted \$35,089, the value of lead, zinc, and other incidental products of manufacture.

b From this amount should be deducted \$1.042, the value of lead, zinc, and other incidental products per ton of iron produced, leaving the total net cost \$11.028.

Taking up another quality of iron, gray forge pig, the cost per ton of the positive elements is shown in the following summary made from eight establishments in the northern district of the United States:—

Elements of Cost.	Tons of 2240 pounds.	
	Cost of 195,631.	Average cost of one.
Ore.....	\$1,248,808	\$6.334
Cinder, scrap, etc.....	226,402	1.167
Limestone.....	106,883	.546
Coke.....	575,759	2.943
Coal.....	80,419	.411
Total materials.....	2,238,271	11.441
Labor.....	267,677	1.317
Officials and clerks.....	29,255	.160
Supplies and repairs.....	110,558	.565
Taxes.....	5,254	.027
Total.....	2,641,015	13.500

The insurance for several of the establishments covered by this last table was \$0.011, interest, \$0.136, and depreciation of value of plant, \$0.050, or a total of \$0.197 per ton.

For Great Britain, on the same kind of iron, gray forge pig, the results drawn from the returns of three establishments are shown to be as follows:—

Elements of Cost.	Tons of 2240 pounds.	
	Cost of 34,696.	Average cost of one.
Ore.....	\$127,733	\$3.681
Cinder, scrap, etc.....	1,478	.043
Limestone.....	12,539	.361
Coke.....	99,997	2.882
Coal.....	908	.026
Total materials.....	242,655	6.993
Labor.....	24,178	.697
Officials and clerks.....	1,695	.049
Supplies and repairs.....	9,132	.263
Taxes.....	994	.029
Total.....	278,654	8.031

None of these establishments considered depreciation of value of plant as a legitimate charge to cost of production, but from two of them it is found that the insurance would be \$0.001 per ton, interest, \$0.199, or a total of the theoretical elements of \$0.200 per ton additional cost, were they added to the foregoing positive cost.

The following table shows the cost of positive elements of Bessemer pig iron in twenty-four establishments in the northern district of the United States : —

Elements of Cost.	Tons of 2240 pounds.	
	Cost of 797,772.	Average cost of one.
Ore.....	\$7,346,496	\$9.209
Cinder, scrap, etc.....	83,002	.104
Limestone.....	345,769	.433
Coke.....	2,630,997	3.296
Coal.....	164,447	.206
Total materials.....	10,570,711	13.250
Labor.....	1,106,622	1.386
Officials and clerks.....	126,015	.158
Supplies and repairs.....	425,056	.533
Taxes.....	31,158	.039
Total.....	12,258,562	15.366

From the returns of the establishments that considered what I have designated "theoretical elements" as part of the cost, it is found that insurance adds \$0.009 per ton, interest, \$0.103, depreciation of value of plant, \$0.110, or a total of \$0.222 per ton. There is no Bessemer pig iron made in the southern states; or, at least, there was not at the time the facts herein given were collected; but for Great Britain the cost of positive elements of Bessemer pig in four representative establishments was as follows : —

Elements of Cost.	Tons of 2240 pounds.	
	Cost of 174,144.	Average cost of one.
Ore.....	\$1,066,282	\$6.123
Cinder, scrap, etc.....	33,819	.194
Limestone.....	86,740	.211
Coke.....	459,061	2.636
Coal.....	1,914	.011
Total materials.....	1,597,836	9.175
Labor.....	116,429	.669
Officials and clerks.....	9,762	.066
Supplies and repairs.....	70,771	.406
Taxes.....	3,405	.020
Total.....	1,798,203	10.326

The theoretical elements in the Bessemer pig, as given by several of the foregoing establishments, consist entirely of interest charge, which is \$0.084 per ton, neither of the establishments considering it worth while to incorporate insurance and depreciation of value of plant in the cost.

From the considerations which have been given of the difficulties surrounding the collection and classification of statistics relating to cost of production and the statistical illustrations drawn from the report in question, it will be seen that a basis for such statistics consists of two parts. First, all those elements of cost which are positive in their nature, which are absolutely essential for the production of articles, and which are universally uniform or generally uniform in their character. All the facts brought under this general designation should be considered altogether and entirely separate from what has been called theoretical elements. The second part of the basis should comprehend all those elements which are shifting in their nature, and which exist only in certain cases, and when they do exist are elements of advantage or disadvantage rather than essential elements in production.

A FORMULA FOR PREDICTING THE POPULATION OF THE UNITED STATES.

BY PROF. H. S. PRITCHETT.

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It is often desired to represent by a mathematical equation the law connecting a series of observations for which theory gives no explanation. In such a case ignorance of the physical cause of the phenomena observed does not diminish the accuracy of the computed formula for purposes of prediction, provided the observations are accurate and there are enough of them, and provided the same causes continue to operate.

As the forces giving rise to a series of phenomena become more complicated, the equation which would represent the law connecting the phenomena would generally be correspondingly complicated. When such observed quantities result from a few general causes modified by factors varying among themselves in magnitude and direction, it may be possible to represent the observations fairly well by a comparatively simple equation.

The problem of deriving an equation to represent the law of growth of population in the United States is such a case. The factors entering into this growth, such as birth rate and death rate, immigration and emigration, etc., are more numerous and fluctuating than in older and longer-settled countries. Since, however, the only trustworthy means of predicting the population for the future consists in reasoning from the law of growth in the past, it has seemed to me an interesting question to see how nearly the data already at hand could be represented by a mathematical function.

The data available for this discussion, up to December,

1890, are contained in the ten enumerations of the census from 1790 to 1880 inclusive. The results of these enumerations are given in the following table. The population there given is exclusive of the inhabitants of Alaska and of Indians on reservations.

Year.	Population.	Year.	Population.
1790	3,929,214	1840	17,069,453
1800	5,308,483	1850	23,191,876
1810	7,239,881	1860	31,443,821
1820	9,633,822	1870	38,558,371
1830	12,866,020	1880	50,155,783

A preliminary plat showed that these values could be approximately represented by a parabola, and would be closely represented by an equation of the form:—

$$P = A + Bt + Ct^2 + Dt^3$$

where P represents the population and t the time from some assumed epoch.

Expressing the population in millions and fractions of a million, and the time (t) in decades (census years) counting from 1840, the observations furnish the following 10 equations of condition for determining the constants A , B , C and D :—

		$v.$
$A - 5B + 25C - 125D - 3.929$	$= 0$	$+ 0.078$
$A - 4B + 16C - 64D - 5.308$	$= 0$	$- 0.038$
$A - 3B + 9C - 27D - 7.240$	$= 0$	$- 0.176$
$A - 2B + 4C - 8D - 9.634$	$= 0$	$- 0.060$
$A - B + C - D - 12.866$	$= 0$	$+ 0.119$
$A - 17.069$	$= 0$	$+ 0.411$
$A + B + C + D - 23.192$	$= 0$	$+ 0.052$
$A + 2B + 4C + 8D - 31.443$	$= 0$	$- 0.982$
$A + 3B + 9C + 27D - 38.558$	$= 0$	$+ 0.758$
$A + 4B + 16C + 64D - 50.156$	$= 0$	$- 0.163$

Solving by the method of least squares, there result the following normal equations:—

$$\begin{aligned} 10 A - 5 B + 85 C - 125 D - 199.395 &= 0 \\ - 5 A + 85 B - 125 C + 1333 D - 307.645 &= 0 \\ + 85 A - 125 B + 1333 C - 3125 D - 1598.197 &= 0 \\ - 125 A + 1333 B - 3125 C + 25405 D - 3409.531 &= 0 \end{aligned}$$

From their solution we obtain the most probable values of A, B, C, and D as follows:—

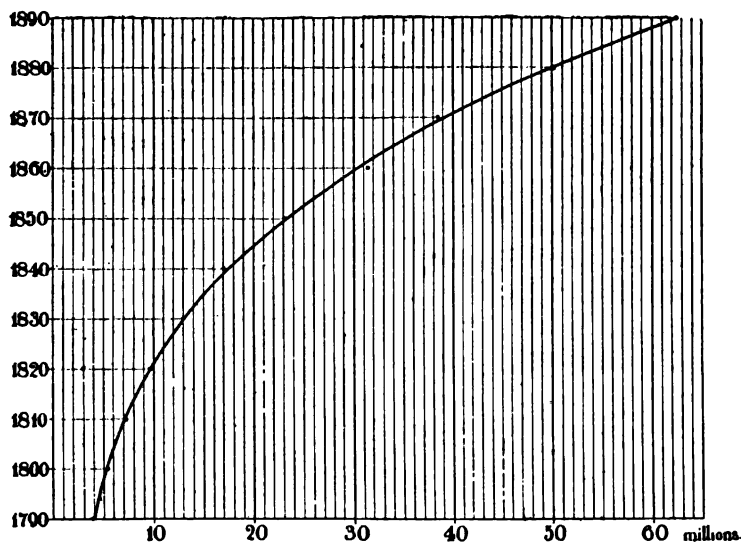
$$\begin{aligned} A &= + 17.47969 \\ B &= + 5.09880 \\ C &= + 0.634506 \\ D &= + 0.0307275 \end{aligned}$$

Accordingly, the population "P" for any time "t" would be represented by the equation:—

$$P = 17.47969 + 5.0988 t + 0.634506 t^2 + 0.0307275 t^3. \quad . \quad . \quad (1)$$

This equation is evidently not what might be called a normal or natural population curve. It has no asymptotes and P becomes zero for a value of t equal to about -9.4 , corresponding to the year 1746. For larger negative values of t , P becomes negative. This, however, is what is to be expected from the data used, since the population there given is not the result of a slow natural growth from an original small beginning, but is largely the result of accretions from outside.

How accurately this formula represents the observed values of the population will be seen from the graphical representation of the computed curve which follows. In this plat the axis of Y is the time axis, and the abscissas represent the population expressed in millions. The observed values of the population for each decade are represented by the black dots, and the black-line curve is furnished by formula (1). With the exception of the values for 1860 and 1870, it will be noted that the curve fits the observations with great exactness.



Substituting the values of A, B, C, and D into the equations of condition, there result the residuals given in the column headed "*v*." An examination of these residuals brings out several interesting facts.

The smallness of the residuals, and the consequent close agreement of the formula with the observations, establishes the fact that the general growth of the population has been in the main a regular and orderly one.

There are two residuals which have abnormally large values. These occur in the equations furnished by the Census of 1860 and the Census of 1870. The Census of 1860 shows a population 982,000 greater than the computed value, while the Census of 1870 falls 758,000 short of the computed value. The explanation of these discrepancies is to be found in the effects of the civil war upon the growth of population. The devastating effect of the war would show itself in the Census of 1870 and succeeding years. This effect would be to give a value of the population in 1870 much below that which would be expected. This is precisely what we find to be the

case, the census enumeration in that year falling 758,000 below the computed value. An abnormally small value in 1870 would, of course, have its effect upon the population of succeeding decades, and would give an apparent difference of opposite sign to the observed population in 1860. There is, however, good reason to believe that the value of the population as determined by the census in 1870 is much smaller than the population really was at that time, and there can be little question that the computed value is much nearer the truth than the census determination at that date. The present Superintendent of the Census, Mr. Robert P. Porter, makes the following statement concerning the Census of 1870 (*Census Bulletin No. 12*, Oct. 30, 1890):—

It is well known, the fact having been demonstrated by extensive and thorough investigation, that the Census of 1870 was grossly deficient in the southern states, so much so as not only to give an exaggerated rate of increase of the population between 1870 and 1880 in these states, but to affect very materially the rate of increase in the country at large.

These omissions were not the fault nor were they within the control of the Census Office. The Census of 1870 was taken under a law which the Superintendent, General Francis A. Walker, characterized as "clumsy, antiquated, and barbarous." The Census Office had no power over its enumerators save a barren protest, and this right was even questioned in some quarters. In referring to these omissions the Superintendent of the Tenth Census said in his report in relation to the taking of the census in South Carolina: "It follows as a conclusion of the highest authority either that the Census of 1870 was grossly defective in regard to the whole of the state or some considerable parts thereof, or else that the Census of 1880 was fraudulent." Those, therefore, who believe in the accuracy and honesty of the Tenth Census—and that was thoroughly established—must accept the other alternative offered by General Walker, namely, that the Ninth Census was "grossly defective." What was true of South Carolina was also true, in greater or less degree, of all the southern states.

There is, of course, no means of ascertaining accurately the extent

of these omissions, but in all probability they amounted to not less than 1,500,000. There is but little question that the population of the United States in 1870 was at least 40,000,000, instead of 38,558,371, as stated.

The computed value just given is 39,816,000; but this is, of course, affected to a certain extent by the error in the Census of 1870, which entered into the computation of formula (1). To compute a value for 1870 which shall be derived from data unaffected by the deficit due to the war, it will be necessary to discuss the observations from 1790 to 1860 alone. The data furnish the following 8 equations of condition:—

$A - 5 B + 25 C - 125 D - 3.929 = 0$	$v.$ — 0.083
$A - 4 B + 16 C - 64 D - 5.308 = 0$	+ 0.166
$A - 3 B + 9 C - 27 D - 7.240 = 0$	+ 0.010
$A - 2 B + 4 C - 8 D - 9.634 = 0$	— 0.090
$A - B + C - D - 12.866 = 0$	— 0.136
$A - 17.069 = 0$	+ 0.112
$A + B + C + D - 23.192 = 0$	+ 0.083
$A + 2 B + 4 C + 8 D - 31.443 = 0$	— 0.061

Solving by the method of least squares for the value of A, B, C, and D we obtain the following function:—

$$P = 17.1819 + 5.210279 t + 0.8201904 t^2 + 0.0623182 t^3 \dots (2)$$

How closely this equation fits the observed values will be seen from the table of residuals. These residuals show that during the 70 years from 1790 to 1860 the growth of population followed the law expressed by equation (2) very accurately, and also that this rate of growth was more rapid than that of later decades. Had this rate of growth continued to 1870, the population would have amounted at that time to 41,877,100. The diminution during the decade due to those actually killed, to lessened immigration and decreased birth rate, cannot be stated with exactness, but probably approximates 1,700,000. After deducting this loss it does not seem

possible that the population in 1870 could have been less than 40,000,000, a result entirely in accordance with the conclusions arrived at by the last two Superintendents of the Census.

Had the population continued to grow after 1860 at the same rate as before, we should have had in 1890 a population of over 71 millions, about nine millions more than we really have. It is scarcely possible that the whole of this difference is chargeable to the war, but is probably due in part to a diminishing birth rate.

PROBABLE ERROR.

Assuming the formula correct, there results from the probable error of a single determination of the population ± 0.367 , expressed as a fraction of a million.

This error contains, of course, both the error of the formula and the error of the census enumeration. Assuming A, B, C, and D as independent quantities, we obtain for their probable errors the following values: —

Probable error of A = ± 0.179

Probable error of B = ± 0.127

Probable error of C = ± 0.0178

Probable error of D = ± 0.0066

From these values, expressing P as a function of A, B, C, and D, its probable error may be computed at any time. This probable error would remain a small per cent of the computed population.

VALUE OF THE FORMULA FOR PREDICTION.

How closely formula (1) will continue to represent the growth of population during future decades depends, of course, upon the continuance of the same conditions of growth. A decided change in the birth rate, or rate of immigration, or a destructive war, would bring out a large discrepancy between the computed and observed values. A fair test of the formula is found by computing the population for 1890. According to the formula, we should expect in 1890 a

population of 62,677,280. The Census Bureau has within the last few weeks finished its count of the population in 1890, obtaining the result 62,622,280. The agreement between these two results is all that could be desired, the difference of 55,000 being within the limit of error of both the formula and the census count.

The general law governing the increase of population, as usually stated, is that, when not disturbed by extraneous causes, such as wars, pestilences, immigration, emigration, etc., the increase of population goes on at a constantly diminishing rate. By this it is meant that the percentage of increase from decade to decade diminishes. The law of growth expressed by equation (1) involves such a decrease in the percentage of growth.

Differentiating equation (1) we have

$$\frac{dP}{dt} = \frac{B + 2Ct + 3Dt^2}{A + Bt + Ct^2 + Dt^3}$$

which diminishes as t increases, and approaches zero as t approaches infinity. In 1790 the percentage of increase per decade was 32 per cent; in 1880, 24 per cent; in 1990 will be 13 per cent, and in 1000 years will have sunk to a little less than 3 per cent.

In order to include all available data, I have re-solved for A, B, C, and D including the data of 1890. This would yield the following 11 equations of condition:—

A — 5 B + 25 C — 125 D — 3.9292	= 0	+ 0.083
A — 4 B + 16 C — 64 D — 5.3085	= 0	— 0.041
A — 3 B + 9 C — 27 D — 7.2399	= 0	— 0.181
A — 2 B + 4 C — 8 D — 9.6338	= 0	— 0.065
A — B + C — D — 12.8660	= 0	+ 0.119
A — 17.0695	= 0	+ 0.415
A + B + C + D — 23.1919	= 0	+ 0.058
A + 2 B + 4 C + 8 D — 31.4433	= 0	— 0.975
A + 3 B + 9 C + 27 D — 38.5584	= 0	+ 0.754
A + 4 B + 16 C + 64 D — 50.1558	= 0	— 0.181
A + 5 B + 25 C + 125 D — 62.6222	= 0	+ 0.012

These yield the following normal equations:—

$$\begin{aligned}
 + 11.0 A + 0.0 B + 110.0 C + 0.0 D - 262.017 &= 0 \\
 0.0 A + 110.0 B + 0.0 C + 1958.0 D - 620.753 &= 0 \\
 + 110.0 A + 0.0 B + 1958.0 C + 0.0 D - 3163.765 &= 0 \\
 0.0 A + 1958.0 B + 0.0 C + 41030.0 D - 11237.254 &= 0
 \end{aligned}$$

From which result the following values of A, B, C, and D:—

$$A = 17.4841 \quad B = 5.1019363 \quad C = + 0.6335606 \quad D = + 0.0304086$$

and the population (P) at any decade (*t*) after 1840 will be given by the equation,

$$P = 17.4841 + 5.1019363 t + 0.6335606 t^2 + 0.0304086 t^3 \dots (3)$$

This formula, being the most probable result deducible from all the data, forms the best basis at hand for predicting the population of the future. In the course of time it is to be expected that this will depart more and more from the observed values, but for the next hundred years will doubtless represent the growth of population within a small percentage of error. Carrying forward the computation, we obtain to the nearest thousand the following values for subsequent dates:—

Year.	Computed Population.	Year.	Computed Population.
1900 . . .	77,472,000	1970 . . .	257,688,000
1910 . . .	94,673,000	1980 . . .	296,814,000
1920 . . .	114,416,000	1990 . . .	339,193,000
1930 . . .	136,887,000	2000 . . .	385,860,000
1940 . . .	162,268,000	2100 . . .	1,112,867,000
1950 . . .	190,740,000	2500 . . .	11,856,302,000
1960 . . .	222,067,000	2900 . . .	40,852,273,000

It would be interesting to discuss in a similar manner the population of some country like France, in which the growth has been but little affected by emigration. It is the intention of the author to do this as soon as the data are available.

It may be said of the results of the whole discussion that they confirm in a general way, and as far as they go, the accuracy of the Eleventh Census.

WEIGHT AND LONGEVITY.

T. B. MACAULAY.

Reprinted by permission from *Papers and Transactions of the Actuarial Society of America*, April, 1891.

The proper selection of lives for a life assurance company is generally considered as coming within the domain of the physician rather than of the actuary. And yet there are few questions on which the statistician cannot throw a little extra light by means of averages and probabilities based on a large number of cases. And this should be and is specially true in all matters relating to insurance, which as a business is entirely based on averages. It is only right, therefore, to expect that even the medical referee may receive valuable hints on several points from the actuarial department, and it is one of these points which I now propose to discuss briefly.

In the early years of the business in Great Britain, it was the custom of many of the companies to compel all applicants to appear personally before the board of directors. The mere certificate of the medical examiner was not considered as sufficient, and the directors wished to see the proposer himself, that they might personally form an opinion as to the risk, from his general appearance. Experience has shown that this precaution was a very desirable one. Mr. Griffith Davies reported, in 1843, that he knew of but one instance in the experience of his company (the Guardian) where the directors had accepted a life which their medical man had pronounced doubtful, but that he had on the other hand known many cases where they had rejected lives which had been reported on favorably by the medical examiner. And there was a reason for this. The average physician was formerly, and too often is now, satisfied with assuring himself that the applicant is merely free from disease. He too often loses himself in the details of the examination, and considers that, because he cannot find anything wrong with any of the organs, he should, as a matter of course, give a first class certificate of health. The non-professional man, on the contrary, is from necessity compelled to

decide on an applicant's present state of health, by his general outward appearance. A man may be entirely free from disease and yet be by no means robust or likely to attain an average longevity. For this reason the precaution adopted by the English companies was unquestionably a very wise one for those times, although of course utterly incompatible with the requirements of an extended business. In these days a personal appearance at the head office is of course, in the vast majority of cases, entirely out of the question, and the only point now open for discussion is, How can this lack be best made up by the companies? I believe that this can be partially done by paying greater attention than is usually given to the relation between height and weight. It is true that there are a great many persons under the standard weight, to even a considerable extent, who may yet have a thoroughly robust appearance, but it is nevertheless true that as a class those who are much under the average weight for their height are proportionately lacking in vigor. The cases when this is not so are the exceptions to the rule.

The most recent discoveries in medical science add fresh importance to this question. Consumption as a disease is due to the presence of bacilli in the system. Where there are no bacilli there is no consumption, and it is claimed that the vast majority, if not all, of those who attain manhood or womanhood were free from bacilli at birth, even though they subsequently succumbed to the disease. It is now pretty generally admitted that consumption itself is but rarely inherited, being usually the result of infection. What is inherited is a peculiarity or weakness of constitution which renders the system unable to resist the influences to which it is exposed. There are immense numbers of tubercular germs floating around like those of many other diseases, and wherever they find a suitable soil they take root and grow. On a robust constitution they will usually fail to obtain a hold, but any feebleness is apt to supply the needed ground. Since the mere fact of being much under the average weight is in itself usually a proof of some such weakness of constitution, it requires no argument to show how much importance should be attached to this question by life assurance companies. And that this connection between light weight and consumption is no mere theory has been abundantly proved, as will be hereafter shown.

For the discussion of the matter it is evident that the first point to be settled is a correct standard by which applicants can be judged.

Tables of model weights, based on various theories, have been prepared. The usual supposition is that the weight and bulk of a man increase as the cube of his height, the formula being: weight in pounds = $\frac{(\text{height, in inches})^3}{2,000}$.

This is an ingenious supposition, and the results come very near to the truth, but no mere supposition is as satisfactory as a record of actual facts, if that can be obtained. An average based on the experience of a life assurance company itself is preferable to any theory, however carefully devised. Believing this, the writer some years ago compiled a table for the guidance of his own company from the figures contained in two thousand of its own accepted applications, taken in numerical order. The result is given below. For the sake of comparison there are placed beside it the corresponding figures from the theoretical table mentioned above, and also from that known as the "American Standard."

STANDARD WEIGHT.

Height.	True Standard.	Theoretical Standard.	"American Standard."
5 ft. 1 in.	125 lbs.	113 lbs.	120 lbs.
5 " 2 "	128 "	119 "	125 "
5 " 3 "	131 "	125 "	130 "
5 " 4 "	134 "	131 "	135 "
5 " 5 "	137 "	137 "	140 "
5 " 6 "	141 "	144 "	143 "
5 " 7 "	146 "	150 "	145 "
5 " 8 "	151 "	157 "	148 "
5 " 9 "	156 "	164 "	155 "
5 " 10 "	161 "	172 "	160 "
5 " 11 "	167 "	179 "	165 "
6 " 0 "	173 "	187 "	170 "

From an examination of the above it will be seen that the results obtained by the theoretical formula differ materially from the actual facts. Short men are, on the average, heavier than the theory would show; while tall men are, as a rule, lighter. This would indicate that the assumption that the increase in breadth and general development proceed in exact ratio to the increase in height is incorrect. On the other hand, the so-called "American Standard" comes very close to the mark, although it has evidently been prepared somewhat arbitrarily.

Tables prepared from the actual measurements of bodies of men will naturally be liable to any special features which may characterize the class under examination. It is, therefore, desirable that the standard to be used by a life assurance company shall be one based on that section of the population from which its business is drawn. For instance, a table prepared by Mr. Greenleaf from recruits accepted for the United States Army during the last three years gives weights which average from seven to ten pounds below those shown by applicants for life assurance. The reason is easily seen. The age of recruits is much under that of applicants for policies, and the table is, therefore, valueless for life assurance purposes. It represents the average weight of immature young men, and not of those in middle life.

The influence of age on weight is very important, as may be seen by the following analysis of the two thousand policy-holders already mentioned.

AVERAGE WEIGHT AT VARIOUS AGES.

Ages.	Weight.
16 to 20	142 lbs.
21 " 25	149 "
26 " 30	153 "
31 " 35	157 "
36 " 40	158 "
41 " 45	159 "
46 " 50	163 "
51 " 55	168 "
56 " 60	172 "

The above throws into relief several interesting features. The weight of the average healthy man is seen to increase rapidly until about age 35, to remain comparatively stationary for the next ten years, and then to advance steadily again until age 60. What course it follows after that age we have no means of tracing, as the data are too few. It will thus be seen that from 20 to 60 the weight increases on the average thirty pounds, or three-quarters of a pound per annum, although the increase is not evenly distributed. A young man may be considerably under the average for his height and yet be perfectly healthy, but the same deviation from the standard in the case of an older person would be very suspicious. Persons between 16 and 20

are usually about thirteen pounds under the average, those between 21 and 25 about six pounds under it, and those between 26 and 30 about two pounds under it; while those between 31 and 40 are slightly over it, and those of higher ages considerably above it, those between 56 and 60 being as much as seventeen pounds beyond the average.

The influence of occupation has next to be considered. The following shows the main results obtained from a re-classification of the same cases:—

AVERAGE WEIGHT OF PERSONS ENGAGED IN VARIOUS OCCUPATIONS.

Occupation.	Weight.
Tailors.....	145.1 lbs.
Clerks and Salesmen.....	147.1 "
Shoemakers and Saddlers.....	148.0 "
Druggists.....	148.1 "
Laborers.....	148.3 "
Manufacturers.....	151.1 "
Founders and Moulders.....	151.3 "
Teachers.....	151.4 "
Carpenters, Coopers, etc.....	152.6 "
Machinists.....	153.5 "
Merchants.....	153.7 "
Bankers, Insurance Managers, etc. .	154.2 "
Blacksmiths.....	155.4 "
Agents, Brokers, etc.....	156.2 "
Commercial Travellers.....	158.1 "
Barristers, etc.....	160.1 "
Physicians.....	160.6 "
Farmers.....	160.9 "
Masons and Bricklayers.....	162.2 "
Clergymen.....	163.7 "
Hotel-keepers.....	166.7 "
Butchers.....	169.3 "

While examining the above it must not be forgotten that the differences shown are not in all cases due to occupation alone. The average age of persons is not the same in all occupations. For instance, bankers, barristers, and merchants are, as a rule, older than their clerks and salesmen, and are, in fact, as a class, composed chiefly of persons who have graduated from the humbler positions.

Let us now proceed to consider the influence of climate. The cases on which the standard previously mentioned is based were exclusively Canadian. The impression is very general that the average prevailing in the tropics is considerably below this. To test this point

I have had another table of averages prepared, based on applications received from the British West Indian Islands, with the following results:—

AVERAGE WEIGHT OF HEALTHY WHITES IN BRITISH WEST INDIES.

Height.	Weight.	Height.	Weight.
5 ft. 1 in.	125 lbs.	5 ft. 7 in.	144 lbs.
5 " 2 "	128 "	5 " 8 "	149 "
5 " 3 "	131 "	5 " 9 "	154 "
5 " 4 "	135 "	5 " 10 "	160 "
5 " 5 "	138 "	5 " 11 "	166 "
5 " 6 "	141 "	6 " 0 "	173 "

It will be noted that this table agrees very closely indeed with that based on Canadian lives. The average height of British West Indian whites was 5 ft. 8.4 in., and their average weight 153.2 lbs., while the corresponding figures of the Canadian applicants of British extraction were 5 ft. 8.6 in., and 155.0 lbs. The two tables, therefore, practically agree, and the conclusion would appear irresistible that the northern standard is a fair one for West Indian whites also. An examination of the question of age, however, shows that the average age of these cases exceeds that of the Canadians, and that the standard weight is not reached in the West Indies till a little later in life than in the north. It follows, therefore, that a somewhat greater laxity may be quite allowable there in the case of young lives.

The above observations on West Indian lives have been confined to the white population. A comparison with mulattoes and blacks may be interesting.

British West Indies.	Height.	Weight.
Average of white applicants, . . .	5 ft. 8.4 in.	153.2 lbs.
Average of mulatto applicants, . . .	5 " 8.0 "	149.2 "
Average of black applicants, . . .	5 " 7.6 "	154.0 "

It will be seen that as regards height the mulattoes, as might be expected, occupy a middle position between the whites and blacks, but in regard to weight they are below both. The proportion of declined cases among the mulattoes (not included above) was, moreover, nearly double that among either whites or blacks. It is, perhaps, a little surprising that the weight of the blacks should be a trifle in excess of that of the whites, but it must be remembered that those blacks who are in sufficiently good circumstances to assure their lives

are apt to be over the average age, and also, perhaps, to a certain extent, picked men physically.

There are certain national characteristics worth noting.

National Characteristics.

Average of British Canadians, . . .	5 ft. 8.6 in.	155.0 lbs.
Average of French Canadians, . . .	5 " 7.3 "	149.9 "
Average of British West Indian whites, 5 "	8.4 "	153.2 "
Average of Spanish West Indian whites, 5 "	6.6 "	144.4 "

The number of female applicants was hardly sufficient to form a thoroughly reliable basis, but as far as they went they agreed almost exactly with the standard for male lives.

In the "Mortuary Experience of the Mutual Life of New York," published in 1877, by Drs. Winston, Gillette, and Marsh, the influence of light weight on mortality was dealt with at some length. They pointed out that nearly eighty per cent of those who had died of consumption in that company had been under the average weight, as indicated by the "American Standard," at the time for applying for assurance. This is certainly startling, but not necessarily conclusive, since the average age at entry of consumptive cases was probably younger than that of the whole company. But no objection can apply to those who entered between the ages of 30 and 40, since the average weight at those ages should be even a little beyond the standard, and yet it was found that of 227 consumptives who assured between those ages only forty-eight were over the average, while 179, or seventy-nine per cent, were under it. This result is certainly surprising and ominous. The conclusion drawn by the authors was summed up in the following words: "We consider it proved by our tables that a weight below the average is a very suspicious circumstance, as indicating a tendency to consumption, and would advise that all persons presenting such disproportionate figure should be most carefully scrutinized."

The most thorough and practical, and therefore the most valuable, contribution to this phase of the subject is that contained in the experience of the Washington Life Insurance Company, compiled by their actuary, the esteemed secretary of this association, Mr. Pierson, and their medical officer, Dr. J. W. Braunan. I extract a few points.

Those who died from	Average Height.	Average Weight.
All causes,	5 ft. 8.2 in.	156.2 lbs.
Consumption,	5 " 8.2 "	143.7 "
Other causes,	5 " 8.2 "	158.9 "

Although the height was exactly the same in all classes, the consumptive cases were, on the average, 15 lbs. under those who died from other causes.

PROPORTION OF DEATHS FROM CONSUMPTION TO TOTAL DEATHS.

Among those whose weight was	Per Cent.
Above standard,	5.47
Standard,	17.86
Below standard,	30.72
Whole company,	17.65

In the above classification the standard group included all those whose weight was within five pounds above and five pounds below the "American Standard," while the others included those above and below this class respectively.

The following table shows how great is the importance to be attached to weight in the way of either accentuating or annulling any predisposition towards consumption, either hereditary or personal : —

PROPORTION OF DEATHS FROM CONSUMPTION TO TOTAL DEATHS.

Among those who were	Persons Having Some Tubercular Taint Either in Family or Personal History.	Persons with no Taint Whatever.
Over Standard Weight.....	6.13 per cent.	5.28 per cent.
Standard Weight.....	27.27 "	15.84 "
Under Standard Weight.....	48.39 "	24.21 "
Total.....	28.35 "	14.56 "

It is thus evident that the concurrence of light weight and bad or doubtful family history must be looked upon as a matter of the greatest importance, while, on the other hand, an excess of weight may fairly be looked upon as to a certain extent counterbalancing any taint in the family history, or even in the personal record.

Following up this line of thought, I have had the experience of our own company (the Sun Life Assurance Company of Canada) worked out, with the following results : —

Total number of death claims, 491
Those from consumption, 126, or 25.7 per cent.

This percentage is naturally high owing to the fact that the great majority of the policy-holders are yet young men, and consumption,

of course, forms a much larger proportion of the deaths at those ages than afterwards. We have, moreover, included as consumptive cases a number of deaths which we believe to be really due to that disease, but which in other classifications might have been placed under the names recorded in the certificates, such as "chronic bronchitis," "chronic pneumonia," etc.

	Average Height.	Average Weight.
Consumptive cases,	5 ft. 8.6 in.	150.3 lbs.
Non-consumptive cases,	5 " 8.6 "	159.6 "
(Not including "respiratory" diseases.)		

Of the 126 consumptive cases there were:—

Standard weight or above,	32
Below standard weight,	94

Just about 75 per cent (74.6) of all the consumptive cases were thus under the average weight at the time of assuring.

By arranging the cases again into three groups, one including all those whose weight is within five pounds above and five pounds below the true standard, and the two others consisting of those above and below this class, we obtain the following table:—

PROPORTION OF CONSUMPTIVE CASES TO TOTAL DEATHS.

Above standard,	14.9 per cent.
Standard,	24.1 " "
Below standard,	34.3 " "
Whole company,	25.6 " "

The next table deals with the question of family history:—

PROPORTION OF CONSUMPTIVE CASES TO TOTAL DEATHS.

Among those who were	Family History Perfect.		Family History Tainted or Doubtful.	
	Number.	Per Cent.	Number.	Per Cent.
Above standard weight	7	8.1	14	22.9
Standard.....	14	15.9	20	42.5
Below standard.....	40	29.0	24	43.7
Whole company.....	61	19.6	65	36.3

These figures speak eloquently as to the influence of a bad or doubtful family history. They also speak with no uncertain voice as

to the effect of light weight in intensifying the danger from any family taint, and of any excess of weight in reducing such danger. They thus confirm strongly the conclusions deduced from the records of the Washington Life, although they, on the other hand, by no means go so far as to promise any practical immunity from consumption to those who are above the average weight, as the experience of that company would seem to indicate. It will, however, be noticed that the number of cases of this kind under observation is very small in both companies, and the probability is that the truth lies between the two conclusions.

Further comment on such figures seems unnecessary. My aim has been to show that the question of weight has a most important bearing on mortality, and is deserving of the most careful attention of all life companies. If I have succeeded, my task is finished.

SOME RESULTS OF SANITARY LEGISLATION IN ENGLAND SINCE 1875.

BY GARY N. CALKINS, S.B.

The *Revue Scientifique* for April contains a review of an article by M. H. Monod on the results of sanitary legislation in England. This article is entitled *Les résultats des mesures sanitaires en Angleterre depuis 1875*, and advocates the extension of sanitary measures in France, where the diminution in population has lately caused much concern.

In 1875 a general law was passed in England for the protection of the public health. This was known as the Public Health Act, and from this time the death rate in England has decreased for all diseases which owe their origin and growth to defective drainage and impure water supplies. Typhoid fever is such a disease, and the diminution of 57 per cent in the death rate from this malady is undoubtedly the greatest triumph for sanitary reformers.

The cost of sanitary improvements up to 1890 was about \$583,500,000, or a mean annual expense of about \$42,000 000, and the immediate effect was a marked decrease in the number of deaths, as the statistics will indicate.

During the 10 years from 1866 to 1875 the average annual mortality was 22.19 per 1000 inhabitants living, as the following figures show:—

Year.	Rate.	Year.	Rate.
1866	23.4	1871	22.6
1867	21.7	1872	21.3
1868	21.8	1873	21.0
1869	22.3	1874	22.2
1870	22.9	1875	22.7

From 1838, the first year that registration was taken in a careful manner, to 1865 the average annual rate was about 22.35 per 1000 living. It is sufficiently accurate to state that, for the period 1838 to 1875, the average death rate remained about the same.

But for the 10 years of the period 1880 to 1889 the average falls to 19.08; and it is interesting to note that a curve representing the rate since 1875 does not show the great fluctuations which are characteristic of the period before that time. This is probably due to the few epidemics in the last fifteen years, that of 1878 being the most noticeable when there was a large infant mortality from diarrhoea and whooping cough. The great rise in 1849 and again in 1854 was caused largely by an epidemic of cholera. In 1863, 1864, 1865, and 1866 typhoid fever kept the death rate up to an average of 24.31 per 1000. Since 1878 the rate is almost uniformly descending, as the following figures show:—

Year.	Rate.	Year.	Rate.
1879	20.7	1885	19.0
1880	20.5	1886	19.3
1881	18.9	1887	18.8
1882	19.6	1888	17.8
1883	19.5	1889	17.9
1884	19.5	....	....

It seems justifiable to assign as the cause of this diminution in the death rate the operation of the Public Health Act and the execution of duties such as drainage, inspection of water supplies, vaccination, and others, which are becoming better and better understood.

Mr. Farr, in his *Vital Statistics*, estimates the value of human life in England to be about \$770 a head. "The minimum value of the United Kingdom, men, women, and children, is £159 (\$770.36) a head; that is the value inherent in them as a productive money-earning race." (W. Farr, *Vital Statistics*, p. 61.)

The economic value to England of improvements which will check certain diseases, such as typhus, is obvious, for this complaint is especially virulent to man in the adult age, that is, in the age when he is producing to the best of his ability; and, from a strictly practical standpoint, we can calculate the value of the expense to England of the vast sums which she has given out for the protection of the public health.

If we suppose, which is allowable if other things remain the same, that the mortality for each year of the period 1880 to 1889 had been the same as the average annual death rate for the period 1866 to

1875, then, comparing this average with the true rate, we find the number of lives saved has been :—*

Year.	Lives Saved.	Year.	Lives Saved.
1880	43,457	1885	87,722
1881	85,743	1886	80,546
1882	68,412	1887	95,758
1883	72,013	1888	125,680
1884	72,096	1889	124,477

The total gives a gain of 856,804 lives saved, and this, according to Mr. Farr's estimate, represents a social capital of more than \$650,000,000. Thus in 10 years the country has more than regained the sum that was spent for sanitary improvements in the 15 years; and in this calculation nothing figures for maladies avoided; nothing for that which cannot be expressed by figures,—spared grief, better health, and happier life.

Mr. Noel A. Humphreys, in an article published in the *Journal of the Statistical Society*, has proved that, if the death rate should continue as low as it was from 1876 to 1880, the duration of the average life of men would be prolonged two years; that of women more than three years as compared with the English life tables; and that 70 per cent of men and 65 per cent of the women concerned would be from 20 to 60 years of age, or, in other words, that the extra life would be added to the most productive age. (Longstaff: *Studies in Statistics*, p. 226.)

The diminution of mortality is not observed in all forms of disease, and the relative importance of sanitary measures for certain diseases is shown in the following table. The mortality from zymotic diseases from 1861 to 1870 was 42.54 per 10,000 living, and this was reduced to 24.52 in the period from 1880 to 1889, thus diminishing 18.02 per 10,000 inhabitants. This diminution was distributed in the following order :—

Measles	0.02	Diarrhœa, dysentery	2.56
Diphtheria	0.33	Scarlet fever	5.92
Whooping cough	0.78	Typhoid fever.....	6.36
Cholera	0.91		—
Small pox.....	1.14	Total.....	18.02

* I have found mistakes in the *Revue d'hygiène* in the calculation of these figures, and have therefore re-computed them from the Report of the Registrar General for 1889.

Thus, while the number of deaths from typhoid and scarlet fevers has decreased notably, measles, diphtheria, and whooping cough have apparently almost completely escaped the influence of sanitary measures.

Consumption has equally diminished in England in these last years. The mortality from this cause was, in the years 1861 to 1870, 24.89 per 10,000 living. For the period 1880 to 1889 it fell to 17.36, a difference of 7.53 per 10,000.

Let us see in just what manner England has gained by these sanitary improvements; at what period or age life has been saved, and whether the average length of life has been affected. The reports of the Registrar General furnish the necessary data.

In studying the figures for the decade 1871 to 1880 it will be seen that the death rate is unequally distributed for the period of the earlier years, but rises for the later years; for men after 35, for women after 45. This is shown by an instructive table taken from Longstaff's *Studies in Statistics*, published on the opposite page. This shows the death rates for males from all causes per 1000 living at various groups of ages. The average death rate for fifty years is printed in heavy type, as are also the figures for the decade in which the maximum death rate at each age was reached. The last row of figures indicates the rise or fall per cent of the average death rate for the last decade above or below the average for fifty years.

From this table we see that for the early periods of life the death rate has decreased. In the last decennium for example, the maximum rate for males between the ages of 5 and 10 was 9.23 per 1000 in the period 1839-48. The average for the fifty years is 7.78, and the fall from this average in the decade 1879-88 was 28.5 per cent. For the age of 10 to 15 the death rate decreased from the maximum 5.11 in the period 1849-58 to 30.8, and the fall from the average 4.34 for 50 years was 29 per cent. For the ages of 15-20 the fall was 26.3 per cent from the average 6.04. But for the ages between 35 to 45 the maximum death rate was in the decade 1869-78 13.97, and in the last decade 12.51, and the diminution from the average 13.03 for the fifty years falls only 4 per cent; while for the age 45 to 55 the average rate of the last decade exceeds the average for the five decennia by 2.6 per cent, and for the age 65 to 75 it exceeds the average by 3.7 per cent; for the age 55 to 65, 3.3 per cent. But above the age of 85 years the death rate diminishes from the average by 1.1 per cent.

DEATHS PER 1000 LIVING MALES.*

Periods.	All Ages.	0-5	5-10	10-15	15-20	20-25	25-35	35-45	45-55	55-65	65-75	75-85	85-
1839-1848	23.05	71.76	9.23	5.06	7.09	9.45	9.80	12.65	17.83	31.43	66.89	147.5	313.1
1849-1858	23.27	72.68	8.86	5.11	6.87	9.10	9.66	12.80	18.38	31.35	65.88	146.8	306.2
1859-1868	23.47	73.93	8.07	4.50	6.28	8.56	9.76	13.22	18.90	32.62	66.40	146.3	313.4
1869-1878	23.13	69.96	7.18	3.93	5.53	7.75	9.74	13.97	20.01	34.53	69.29	149.5	322.7
1879-1888	20.48	60.13	5.56	3.08	4.45	5.88	7.96	12.51	19.40	33.84	70.24	147.7	309.5
50 Years.	22.68	69.49	7.78	4.34	6.04	8.15	9.42	13.03	18.90	32.75	67.74	147.6	313.0
Fall or Rise Per Cent.	-9.7	-13.5	-28.5	-29.0	-26.3	-27.9	-15.5	-4.0	+2.6	+3.3	+3.7	+0.1	-1.1

* Longstaff, *Studies in Statistics*, Page 260.

From this table we see that sanitary measures affect the death rate for persons between the ages of 1 and 25 years, and especially during the period of youth from 10 to 20 years. Economically this is a great gain, for the 28 per cent of those who might have died during this age have now tided over this period of non-production, when they were a burden on the state, into a producing age. Had they died at the age of 20 or thereabouts the country would have gained no recompense for the expense of maintaining them through the non-productive period.

Or, to put this another way.¹ In 1854 a new-born boy might hope to live 39.91 years. But his son, born in 1880, could hope for 41.35 years. Now, suppose both attain to the age of 40. In the first case 26.06 more years of life might be expected, but in the second case only 25.30. Or again, suppose 1,000,000 male children were born during the period 1838-54, then, at the age of fifty-five, 409,460 would survive; of 1,000,000 male children born during the period 1871-80, at the same age of fifty, 424,677 would survive. But, at the age of seventy-five, 148,076 would survive in the first case, while in the second there would be only 144,960. That is, the death rate during the most mature age is greater than formerly. This may be due to the fact that, with improved sanitary precautions, more feeble children live to maturity and die before attaining to old age; or, perhaps, because of the bustle of the nineteenth century, of the wear and tear upon the nervous system due to competition in densely packed cities and towns.

The effect of sanitary improvements is most noticeable upon infant mortality. If we take 858,878 as the mean annual number of births between 1871 and 1880, the difference between this and the number born in an average year of the period 1838-54 shows a gain of 1,800,047 years,² and this alone is a great defence of the sanitary work now going on. How this may tend to weaken the race is not for me to surmise, at all events it is too late to return to Spartan methods of maintaining the race perfect.

France, it is affirmed, is sadly in need of such sanitary improvements as have diminished the death rate in England during the last twenty years. At present her population is at a stand-still, but it should increase, and, unless it does, there is something wrong in the

¹ *Sanitary Progress*. Edinburgh Review. January, 1891.

² The above figures are taken from *Sanitary Progress*.

body politic, since all surrounding countries are growing rapidly in population. Whatever the cause may be for such a small number of births per year, whether moral, or physical, or political, they are all remote and obscure, but the death rate is something that can be viewed and compared, and its causes investigated. Dr. Brouardel,¹ in a recent address before the *Académie de Médecine*, called attention to the disproportionate death rate in France from small pox and typhoid fever. In Germany 110 persons are lost annually by small pox, while in France the number is no less than 14,000. Dr. Brouardel attributes this to the rigidity with which vaccination is enforced in Germany, and the laxity in France.

There are 23,000 deaths from typhoid fever per year in France, and this was shown to be largely due to water supply. Thus in Vienna, before pure water was introduced, the death rate was 200 per 100,000 inhabitants; after the introduction of good water it fell to 10.

In Angoulême pure water reduced the number of deaths from typhoid fever in the proportion of 18 to 0.063. In Amiens from 111 in 10,000 to 7. In Rennes from 43 in 10,000 to 2. Dr. Brouardel affirms that if vaccination and re-vaccination were obligatory in France, and that if towns were compelled to supply pure water, the saving of life would amount to from 25,000 to 30,000 annually, and this would make considerable difference in the population.

¹ *London Lancet*, January, 1890.

REVIEWS AND NOTICES.

LONGSTAFF'S STUDIES IN STATISTICS.

Studies in Statistics. Social, Political, and Medical. By George Blundell Longstaff, M.A., M.B., etc. London: Edward Stanford. 1891. 8vo. Pp. 455. Maps and diagrams.

In this valuable volume Dr. Longstaff has compiled many of the statistical tables of the Reports of the Registrar Generals, which, to use his own language, "form a vast reservoir, into which a ceaseless stream of facts has been flowing for more than half a century. To disturb the dust upon these shelves; to fish out facts; to group, arrange, compare, and ponder over them has long been my hobby."

The principal sources employed in the compilation of the work are the Annual Reports, Decennial Supplements, Quarterly Returns, Weekly Returns, and Annual Summaries of the Registrar General's Office of England, The United States Census of 1880, The Almanack de Gotha, The Census of France of 1881, The Statesman's Year-Book, The Report of the Government Statist of Victoria, and the Supplementary Reports of the Medical Officer of the Local Government Board of England.

The first three chapters are elementary, one being devoted to the general subject of Death Rates, in which the use of the term "rate" as employed by the vital statistician is very intelligently explained. The third chapter treats of the Birth, Death, and Marriage Rates of England and Wales for a period of fifty years.

A satisfactory reply is given to the statement of certain social philosophers that epidemics do not materially affect the general death rate. Dr. Longstaff says in reply: "I do not deny that there is *some* truth in these assertions, but any benefit to the average health standard of the community that may result from an epidemic removing weakly individuals is completely overwhelmed by the permanent injury that in too many cases results to the constitutions of those who are attacked by the epidemic, and indeed escape from death, but

recover imperfectly, and have to go through life weakened or maimed. We have, in short, to deal not only with killed but with wounded."

Several chapters are devoted to the growth of new nations, the United States taking a prominent place. In this chapter the author shows the remarkable growth of the population, at the same time lamenting the fact that we have no general system of registration in by far the greater number of the states. He states that the immigration statistics of the United States are overestimated and presents the following figures in support of his position.

EMIGRATION TO THE UNITED STATES. FIVE YEARS, 1882-86.

From.	U. S. Figures.	British and German Figures.	Excess of U. S. Figures. Per Cent.
United Kingdom.....	688,865	572,003	20.4
Germany.....	833,938	666,421	25.1

His estimate of the natural increase (by excess of births only) for the United States is about two per cent annually. The Indian, the Chinese, and the Negro questions are briefly but intelligently discussed, as are also the composition of the different nationalities represented in the population of the United States. The remaining new countries to which special chapters are devoted are Canada, South America, and Australia. Other chapters follow upon the growth of cities and upon the food supply.

In the chapter entitled "Suggestions for the Census" the following questions are discussed:—

1. How frequently should the census be taken? To this, after a thorough discussion of the question, he replies: "The Census Act of 1890 should be so framed as to establish the census upon a permanent *quinquennial* basis."

2. What questions should be asked in the schedule? The author suggests several additional points to those already contained in the schedules. The inquiry as to *sickness* does not appear to present such obstacles to the author as were frequently met in the United States Census of 1890.

3. How are the results to be tabulated? In reply to this question the author quotes the valuable experience of M. Körösi, of Budapesth, and also makes several distinct suggestions with reference to future work.

The concluding chapters, which form one-half of the volume, are devoted to the discussion of the following medical topics: The decline in the English death rate; Causation of summer diarrhœa; Statistical indications of a relationship between scarlatina, erysipelas, puerperal fever, and certain other diseases; Distribution of diphtheria, phthisis, pneumonia, and bronchitis, are they epidemic diseases? Communicability of phthisis; Continued fevers in London; and Hydrophobia.

Among the prominent causes to which the decline in the death rate may be attributed, Dr. Longstaff enumerates a diminished number of deaths from fever and phthisis, and to a somewhat less degree from scarlet fever, diarrhœal diseases, small-pox, diphtheria, and measles. There has also been a marked diminution of the indefinite class entitled "all other causes." Coincidentally with this decline in certain diseases there has also been an increase in the mortality from certain other diseases, notably diseases of the heart, lungs, kidneys, and from cancers. The increase is less than the decrease.

As an inference he states: "Since the falling causes of death *can* only fall to zero, but the rising causes *may* rise indefinitely, the present changes may conceivably in the course of time lead to a rise in the general death rate."

The tendency for useful working life appears to be increased, but for old age to be slowly shortened. In the chapter on summer diarrhœa the author discusses the three questions: (1) Where does it kill? (2) When does it kill? (3) Whom does it kill?

To the first inquiry he concludes that the mortality is mainly in towns (as opposed to country districts), but with some remarkable exceptions. To the second, that deaths become more numerous about June 1 (three weeks after the temperature of the air rises above 50° F.), and that a fortnight after the temperature has risen to 60° F. they begin to exceed the mean. The greatest number of deaths from this cause occurs in the first week in August,* after which the numbers fall as they rose.

To the third question he replies that this disease kills persons of every age, but young infants in by far the largest proportions.

In the chapter on the distribution of diphtheria it is shown that the mortality from this disease in England is greatest in the rural districts. Assuming that of the dense districts as 1000, the figures are as follows:

* In Massachusetts last week of July. Mean of six years observations.

Mortality from diphtheria in dense districts, 1000					
"	"	"	medium	"	1178
"	"	"	sparse	"	1507

To this he adds: "If, therefore, it were worth while to undertake the immense labor of correcting all my calculations for differences of *age and sex constitution*, the striking contrast that I have endeavored to bring out between the liability of rural and urban populations to fatal diphtheria would be *still more marked*."

The question of the probability of the accidental and fatal incidence of phthisis upon both husband and wife is treated from a purely mathematical standpoint, the problem being to ascertain from the materials at hand how frequently such coincidences might be expected to occur as a *pure matter of chance* on the hypothesis that phthisis is *not* a communicable disease.

He concludes that, to show any substantial argument for the existence of infection, it would require a much larger collection of cases than has yet been published. The chapter on hydrophobia will be of special interest to American readers in the present epidemic years of the disease. Hydrophobia destroyed 944 persons in England and Wales in the period 1847-85. It was five times as fatal in the latter half of this period as it was in the first half. London did not suffer so severely as other parts of the Kingdom as the police order of 1885 checked the spread of the disease. It is most fatal between the ages of 5 and 15, and many more males die at all ages than females. Its geographical distribution is peculiar, Lancashire suffering most, Cheshire and Yorkshire next.

The author concludes this most excellent volume as follows: "My hope throughout has been that increased knowledge of facts, alike in matters political and matters medical, may tend to make legislative and administrative efforts more reasonable, and less empirical. Sure progress is more likely to be attained by the diligent and patient study of details than by the more showy and more attractive method of *à priori* speculation, which is but too apt to lead to rash and possibly disastrous experiments."

S. W. ABBOTT.

KEYNES ON STATISTICS.

The Scope and Method of Political Economy. By John Neville Keynes, M.A., London. Macmillan and Company. 1891. Pp. xiv, 359.

Although this book, as the title implies, is primarily for political economists, it includes in the closing chapter of about forty pages a discussion of statistical art and methods which will be of special interest to the statistician. The bulk of the work is devoted to a restatement of the proper methods to be employed in economic reasoning. The relative and absolute importance of induction, deduction, mathematical and symbolic formulæ, and history as applied to political economy are given careful consideration. The last chapter is devoted to "Political Economy and Statistics," and a brief enumeration of "some of the precautions requisite in the use of statistics in economic reasonings." The generous treatment here given to statistics as representing a distinct method to be used in economics is evidence of the advance which this subject of study has made in the past twenty-five years. Although Mill and Cairnes discussed the question of method in economic reasoning with thoroughness for their day, yet they gave but scant recognition to statistics as an independent aid and support.

In the first part of the chapter devoted to statistics the author enters upon the question whether statistics is a science or not. His conclusions are not favorable to the assumption put forth by many Continental, and more recently by a few English and American, authors that statistics can rank as a distinct science. Mr. Keynes fairly presents the different views upon this point, and criticises in turn the definitions of Dr. Mouat, Dr. Mayr, and Prof. Mayo-Smith. These in one way or another look upon statistics as a science. With none of these conceptions does the author agree. But while not regarding statistics as a distinct science, Mr. Keynes concludes that "it is indeed necessary to recognize a theory of statistics, dealing with what may be called the technique of the statistical method, that is to say, the conditions that statistical data must fulfill, the modes in which they are to be ascertained and collected, the manner of their arrangement and employment for purposes of reasoning, the criteria

determining the validity of arguments based upon them, and the logical character of the conclusions established by their aid." Statistics, then, is a "scientific method based on the quantitative observations of aggregates."

In the denial that statistics is an independent concrete science, Mr. Keynes, in my judgment, is entirely correct, but it is doubtful if the term "method" contains the full meaning and all the attributes which properly belong to statistics. The statistician, as such, is engaged in the collection and preparation of data admitting of enumeration, which may afterwards serve as building material for the sociologist, economist, and statesman. Statistical work bears the same relation to the social sciences that the labor of the carpenter and mason does to architecture. Prof. Mayo-Smith, as the author quotes, objects to this view because it implies that the statistician is a mere drudge. But when the overpowering superiority of social science to all other sciences is perceived, and the immense importance, both relative and absolute, of statistical labor as compared with all other methods in order to make progress in these social sciences is more clearly discerned, then there need be no fear about the intellectual position of the statistician. In my opinion, it is a mistake — and this error Mr. Keynes avoids — to give to statistics a too exalted position. We need a regiment of statisticians in every branch of political and social life, and we must not scare off possible recruits by announcing that statistics is an independent and separate science, which demands all that the mastery of a science implies. There are already sciences enough to learn; but every student may be trained in statistical methods for right and honest reasoning in his political and social relations, as he is taught hygiene for healthy living in his private or personal relations.

A special topic which Mr. Keynes considers is the function of statistics in economic inquiries. There are laws in economics which are principally indebted for their discovery to statistics, as, for example, the tendency of financial crises to recur at periodical intervals. It is impossible to enumerate the economic illustrations and problems which the author suggests as involving statistics, but it is to be hoped that teachers of political economy may dwell upon this chapter and be convinced of the importance of giving more attention to statistics.

In the note to this chapter the author briefly discusses (1) the con-

ditions of the reliability of statistical data ; (2) the interpretation of simple statistics ; (3) the range of statistics ; and (4) the grouping of statistics. The treatment throughout, while not intended to be exhaustive, is suggestive, and is a happy omen that in the future political economy will be more closely associated to statistics.

DAVIS R. DEWEY.

UNITED STATES CENSUS BULLETINS.¹

No. 39. March 16, 1891. *Wealth and Resources of Alaska.* By Ivan Petroff. Pp. 15.

The four principal sources of wealth of which an investigation has been made are furs, fish, minerals, and timber. The total value of products shipped from the territory since it came under American jurisdiction is estimated at \$63,000,000. Fur seals is the most important, being credited with \$33,000,000. Other furs were valued at \$16,000,000. The canned salmon product since 1884 is estimated at \$7,000,000, and the cod-fish catch since 1868 at \$3,000,000. No falling off in the annual yield of any of these products is noticed with the exception of the fur seal. The total shipment of gold dust and bullion does not exceed \$700,000 per annum. It appears difficult to ascertain the quantity of merchantable timber, and it is thought that the amount has been overestimated.

No. 40. March 17. *Population by Counties, North Central Division.* Pp. 9.

This division includes Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas. In Nebraska only one county shows a loss.

No. 41. March 19. *Agriculture, Truck Farming.* By J. H. Hale. Pp. 12.

Truck farming in this report is distinguished from market gardening as being carried on at a greater distance from markets. The various details are summarized in the statement that more than \$100,000,000 is invested, the annual products reaching a value of

¹ Continued from page 236.

\$76,517,000, realized upon 534,440 acres of land. This is the first time that this industry has been made a subject of census investigation, and consequently the descriptive matter is of special interest.

No. 42. March 20. *Population by Counties, South Central and Western Divisions.* Pp. 9.

In Arkansas only one county shows a decrease since 1880.

No. 43. March 21. *Coal Product West of the Mississippi River.* By John H. Jones. Pp. 8.

Tables show the product, number of mines, disposition of product, value at mines, average price per ton, number of persons employed, and wages. The quantity of coal has increased three-fold in ten years, and the value has decreased from \$1.93 per ton at the mines in 1880 to \$1.52 in 1889.

No. 44. March 25. *Distribution of Population in Accordance with Mean Relative Humidity of the Atmosphere.* By Henry Gannett. Pp. 3.

No. 45. March 26. *Granite.* By William C. Day. Pp. 41.

This report shows the production of granite throughout the United States, the labor, wages, and capital concerned, uses for granite and the amount consumed for each, methods by which granite is quarried, and a directory of producers. The value of the output in 1889 was \$14,464,000 as compared with \$5,188,000 in 1880. The greatest percentage increase of productiveness since 1880 is found in Minnesota, New York, Delaware, and Georgia.

No. 46. March 27. *Railway Statistics of the New England States.* By Henry C. Adams. Pp. 18.

The bulletins on transportation are among the most valuable of those issued by the census department, as they not only present results but discuss methods and principles involved in the collection and treatment of statistics. From this latter point of view this bulletin in particular has great value. The statistics here presented are in the main a compilation from the records of the railway companies. For a more accurate generalization the whole country is to be divided into ten territorial groups, for each of which distinct sets of averages will be worked out. The tables show mileage, equipment, employes, business done, income and expenses for each year in the decade, 1880-89.

No. 47. March 28. *Distribution of Population by Drainage Basins.* By Henry Gannett. Pp. 5.

This shows that the proportion of the population living within the region drained to the Atlantic is steadily diminishing, while of this region the part drained to the Gulf of Mexico is relatively becoming more populous.

No. 48. April 7. *The White and Colored Population of the South. 1890.* Pp. 27.

During the past decade the white population of the South Atlantic and South Central States, and of Missouri and Kansas, all of which together contain fifteen-sixteenths of the entire colored population of the country, increased at the rate of 24.67 per cent, and the colored element at the rate of 13.90 per cent. The colored race therefore has not held its own, and it is shown that the greater increase of the white population is not due to immigration. Arkansas, Mississippi, and West Virginia are the only States which have a larger percentage of colored population in 1890 than in 1880, and in these the increase is but slight. Comparisons are made for each decade back to 1850, by which it is shown that there has been no extended northward movement of the colored race since the civil war.

This bulletin also contains the count of the Chinese in California. Since 1880 there has been a decrease in this race of 3451, or 4.59 per cent.

No. 49. April 14. *Precious and Ornamental Stones and Diamond Cutting.* By George Frederick Kunz. Pp. 8.

This is the first census inquiry on this subject. The value of the product of precious stones and ornamental stones in 1889 was \$188,807. The diamond-cutting industry is confined to Massachusetts and New York. The value of the product was \$1,006,716.

No. 50. April 15. *Population of Rhode Island by Minor Civil Divisions.* Pp. 3.

No. 51. April 16. *Population of Vermont by Minor Civil Divisions.* Pp. 4.

No. 52. April 17. *Urban Population in 1890. Cities Containing 8000 Inhabitants or more.* Pp. 9.

The urban population in 1890 is estimated as 29.12 per cent of the total population as compared with 22.57 per cent in 1880. In 1880 there were 286 cities with population more than 8000, and in 1890 there were 443.

No. 53. April 20. *Statistics of Education. Alaska, Arkansas, Delaware, Missouri, Iowa, Michigan, Minnesota, Mississippi, New Mexico, New York, North Dakota, Oregon, Texas, Utah, Washington, West Virginia, and forty-two Cities.* By James H. Blodgett. Pp. 34.

This is a continuation of *Bulletins Nos. 17 and 36*, and presents data for the States named on similar lines.

No. 54. April 23. *Public School Finances.* By J. K. Upton. Pp. 12.

The figures in this report are for Arkansas, California, Connecticut, Idaho, Kansas, Louisiana, New Hampshire, North Carolina, Vermont, and Washington, and are mainly from official reports of school superintendents.

No. 55. April 24. *The Relative Economy of Cable, Electric, and Animal Motive Power for Street Railways.* By Charles H. Cooley. Pp. 17.

As street railways do not have any uniform system of accounts, it is difficult to treat their finances by statistical comparisons. It is therefore stated that the statistics presented in this report cannot form a basis for final judgment. The bulletin embraces statistics of fifty lines of street railway, ten of which are operated by cables, ten by electricity, and thirty by animal power.

No. 56. April 25. *Population of Maine by Minor Civil Divisions.* Pp. 7.

No. 57. April 27. *Population of Delaware by Minor Civil Divisions.* Pp. 3.

No. 58. April 28. *Population of Connecticut by Minor Civil Divisions.* Pp. 3.

No. 59. April 29. *Commercial Floriculture.* By J. H. Hale. Pp. 11.

This is the first time that as an industry floriculture has been made a subject of census investigation. The statistics are derived from schedule and personal visits of special agents to florists' establishments. 4659 establishments are enumerated. The value of the product in 1889 was about \$26,000,000.

No. 60. April 30. *Irrigation in New Mexico.* By F. H. Newell. Pp. 14.

This is the second of the bulletins on irrigation, a previous one being issued for Arizona.

No. 61. May 8. *The Production of Mica.* By L. J. Childs. Pp. 6.

Contains a brief review of the industry in 1889 and previous years. The product in 1890 was valued at \$50,000, the greater part of which was credited to New Hampshire.

No. 62. May 9. *Asylums for the Insane in the United States.* By Dr. John S. Billings and W. H. Olcott. Pp. 32.

During the year 1889 there were treated in public and private establishments 97,535 insane persons as compared with 56,205 treated in 1881. This increase does not indicate an increase in the proportion of insane persons to population, but rather a great increase in the amount of asylum accommodation provided and a willingness on the part of the public to make full use of all the facilities thus provided. It is not yet possible to state the total number of insane.

No. 63. May 11. *Distribution of Population in Accordance with Latitude and Longitude.* With diagrams. By Henry Gannett. Pp. 7.

This compares the distribution of the population in 1870, 1880, and 1890.

No. 64. May 12. *Foreign, National, State, and County Indebtedness.* By J. K. Upton. Pp. 52.

This includes tables of the indebtedness of 79 foreign countries, the countries of importance neglecting to send reports being Spain, Mexico, and several of the South American States. The indebtedness of the world in 1880 and 1890 is thus compared:—

Divisions.	Debt Less Sinking Fund.		Increase.	Decrease.
	1890.	1880.		
Total.....	\$26,917,096,680	\$25,818,521,219	\$1,098,575,461	.....
Foreign nations.....	25,636,075,840	23,481,572,185	2,154,503,655	.....
The United States.....	915,962,112	1,922,517,364	.....	\$1,006,555,252
States and territories...	223,107,883	290,326,643	.....	67,218,760
Counties.....	141,950,845	124,106,027	17,845,818	.....

The nominal value in gold of the currency in which the debt was stated has been used wherever it was known. Per capita calculations are made for the second table.

No. 65. May 13. *Distribution of Population in Accordance with Topographic Features.* By Henry Gannett. Pp. 7.

This classifies the population into areas differing in the character of their surface, products, and climate. Twenty-one areas are named.

No. 66. May 14. *Floating Equipment on the Great Lakes.* By Henry C. Adams. Pp. 11.

This bulletin covers all floating equipment except fishing vessels, and is a continuation of *Bulletin No. 29*. The tables show the equipment by lakes and by ports.

No. 68. May 16. *Production of Manganese Ores.* By Joseph D. Weeks. Pp. 5.

The total production of manganese in 1889 was 23,927 long tons, with a value of \$238,939.

No. 69. May 18. *Population of New Jersey by Minor Civil Divisions.* Pp. 6.

No. 70. May 22. *Statistics of Churches.* By Henry K. Carroll. Pp. 27.

This is a continuation of *Bulletin No. 18*, and presents statistics of the Cumberland Presbyterian Church, Church of Jesus Christ of Latter Day Saints (Mormons), Reformed Episcopal Church, United Fratrass or Moravian Church, German Evangelical Synod of North America, German Evangelical Protestant Church of North America, and Plymouth Brethren. The tables show the number of organizations, edifices, seating capacity, halls, value of church property, and number of communicants or members.

No. 71. May 23. *Production of Bluestone.* By William C. Day. Pp. 6.

The value of the product obtained in 1889 was \$1,689,000.

CONGRESS OF DEMOGRAPHY.

The following is the provisional programme of the Division in Demography of the Seventh International Congress of Hygiene and Demography, to be held at London, August 10-17.

On TUESDAY, AUGUST 11TH, after a short address by the President, a discussion will be held upon:—

"Disease and Mortality in reference to Occupation."

"The effect upon Output, of Hours and remuneration of Labor respectively."

On WEDNESDAY, AUGUST 12TH, a discussion will be held upon —

"The Suitability of Tropical High Lands for European Settlement."

"Predisposition of the Black and White Races, respectively, to various Infectious Diseases in its bearing on Racial Distribution."

"Migration of Labor."

On THURSDAY, AUGUST 13TH, will be read —

"Report by Dr. Georg v. Mayr on 'Insurance Societies of the Working Classes,' in pursuance of the resolution passed at the Vienna Congress."

A discussion will be held on the above report, and upon —

"The more Systematic Collection and Utilization of Demographic Statistics."

On FRIDAY, AUGUST 14TH, a discussion will be held upon —

"The Physical Condition of Children at School."

"Anthropometric Facts and Inferences."

It is expected that many subjects, besides the above, will be brought before the Demographic Congress for consideration.

Prof. Richmond Mayo-Smith will attend as delegate of the American Statistical Association.

OLD AGE AND PAUPERISM IN ENGLAND.

The London *Economist* treats of the statistical position of pauperism in England as follows:—

At the end of last January the number of paupers per thousand of the population of England and Wales was 24.3, whereas in January, 1871, it was 47.4, the corresponding figures for London being 22.7 and 50.4, respectively. Thus pauperism has diminished by nearly one-half in the course of twenty years, and only one person in forty is now in receipt of public relief as compared with one in twenty-one in the year 1871. But we agree with Mr. Chamberlain that the

return recently issued by the Local Government Board may well abate our satisfaction. Not only does it show broadly that one-seventh of the entire population over sixty years of age is pauperized, but it also brings out the startling fact that in the case of persons over seventy-five this proportion actually rises to very nearly one-third. In other words, one person in every three of all classes attaining a ripe old age is doomed to be dependent for the means of existence on parish relief either within or without the walls of the workhouse. The following table gives a summary of the return, which seems to be the first of the kind which has been published. For the purpose of comparison we have added a column showing the numbers of the population at each of the specified ages, according to the census of 1881:—

Ages.	Indoor Paupers.	Outdoor Paupers.	Total of Paupers.	Number of Persons in England and Wales at Each of the Ages Specified in the First Column.
Over 60 years of age and under 65..	13,372	27,808	41,180	727,622
65 and under 70	15,807	46,433	62,240	502,460
70 and under 75	16,809	60,899	77,708	349,955
75 and under 80	12,384	48,405	60,879	202,322
80 years and upwards	9,752	35,108	44,860	133,898
Totals.....	68,124	218,743	286,867	1,916,257

It will be seen that the proportion of paupers to population increases continuously for each of these periods of five years after the age of sixty. Between sixty and sixty-five, when a very considerable proportion of persons are practically able-bodied, and are able to earn fair wages even in manual labor, it is about one in eighteen; between sixty-five and seventy there is a sudden drop to one in eight; between seventy and seventy-five it is one in rather more than five; between seventy-five and eighty it is one in nearly three and a half; and over eighty it is one in three. When, however, we analyze the details of the statistics of which this is the summary, we find, as might be expected, very wide differences in various parts of the kingdom. In

the whole country, as already stated, about one in seven of all persons over sixty years of age is in receipt of relief. In London the proportion is not quite one in six. In the manufacturing districts of Northern and Northwestern England it is about one in nine, but in some of the agricultural counties it is as much as one in five. Of course, it has to be remembered that only about a quarter of the persons thus in receipt of relief are in workhouses, and that the rest are outdoor paupers in receipt of allowances which, in many cases, are supplemented by other sources of income.

MORTALITY OF ENGLISH CLERGYMEN.

The following is taken from the *Insurance Post* :—

A report on the mortality experience of the "Clergy Mutual" from 1829 to 1887, compiled by Mr. Frank B. Wyatt, the able actuary of the office, has recently been published. The results of Mr. Wyatt's investigations confirm in a remarkable degree the indications we already possess as to the extremely light mortality prevailing amongst the clergy as compared with the general population. This was shown in the tables published in 1864 by the Rev. J. Hodgson (the founder of this society) from his observations on the lives of the clergy, the "expectation of life" or "mean after life-time" of this class being at age 25 nearly 5 years longer than is given by the "English Life Table, No. 3, Males," at age 40, 3 years longer, and at age 55 over a year and a half longer. These observations were made on the lives of clergymen "unselected" as to medical examination. The present tables being derived from assured lives of clergymen may more fairly be compared with the Institute Hm. Tables, also derived from assured lives; and here again the superiority of the clergy lives is very apparent, the "expectations," according to the society's experience, being at age 25 more than $5\frac{1}{2}$ years longer than by the Hm.; at 40 near 4 years longer, and at 55 more than 2 years longer.

The tables are numerous, and show the results of investigations into the mortality amongst the three classes of lives of which the society's *clientèle* consists,—viz., clergy, lay, and female. Of these the numbers entering were, respectively, 7050, 1800, and 520. The

results are also combined so as to form the general experience. The numbers in the two latter classes are too small to afford reliable data, but so far as they go the figures derived from them support the previous conclusions as to the greater vitality of the clerical lives. Whenever a fresh investigation shall be made into the mortality of assured lives generally, there will be a much larger basis from which to ascertain the value of female assured life than when the Hf. tables were published by the Institute of Actuaries, as, owing to the married women's property act and the great increase in the number of occupations for women, the proportion of female assurants is, we believe, considerably greater now in all offices than it was twenty or twenty-five years ago.

Mr. Wyatt has also given a table of the experience as to "unhealthy lives,"—i. e., those on which an extra premium was charged on account of some defect in personal health or family history. The numbers observed upon were 355, and the deaths 71, against 61, the number expected according to the general experience. The "rating-up" appears to be justified by the result, but here again the numbers are scarcely large enough for practical conclusions to be drawn.

Dr. Stone's analysis of the causes of death amongst the assured is interesting. . . . It is somewhat startling to find so many deaths from violence among a body of men living such peaceful lives as the clergy enjoy, twenty-nine having met their death by accident, ten by drowning, two murdered, and no fewer than seventeen by suicide. The latter appears a very heavy record; the others may, perhaps, be partly accounted for by the supposition that the society numbers many missionaries, naval chaplains, etc., on its books. As a set-off to this chapter of horrors it may be noted that "a very large percentage of the assured have hitherto died from what is approximately a natural sequence of old age."—*Insurance Post, Eng., March 21.*

FIRE STATISTICS.

At the twenty-fifth annual meeting of the National Board of Underwriters, held in New York, May, 1891, the following report of the Committee on Statistics was adopted:—

We see no reason why all the patrol organizations which the

underwriters support should not be instructed to adopt a uniform blank approved by this association, and we believe that if the information desired is confined within reasonable limits, it would be possible to induce the different fire departments to give the same details in their reports. If necessary for the fire departments to obtain authority from the legislature to ascertain the details herein mentioned, it would, we think, be readily granted on its importance being properly shown ; but we believe the desired information could be had without extra legislation with the aid of the insurance companies alone, by their insisting that the values as well as the loss shall always be declared in the proofs. The cases where that information could not be reliably ascertained would be remarkably few. In all cases of suspicious losses, the fire marshal of New York already has full authority to demand such information, and in the few cases where there is no insurance on the property at all there would be so little object in withholding the information from the fire department, as to the value of the property exposed and the amount lost, that with a little persistence it could be readily ascertained.

Your committee therefore recommend the preparation of a blank which shall indicate the information to be sought from every protective organization, and also suggest the importance of soliciting the co-operation of as many fire departments as it is possible to interest in this subject.

To the members of this association and companies outside of it we would earnestly recommend, both for the assistance it would be to the object here sought, and for its own intrinsic value, the addition of a column in every loss book, showing parallel with the percentage of insurance loss the percentage of actual loss to the property involved.

The practical failure of our efforts to obtain statistics regarding a few classified hazards was reported in 1888 (and confirmed in 1889), and our efforts in that direction have therefore not been renewed this year.

AMERICAN STATISTICAL ASSOCIATION.

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Read before the AMERICAN STATISTICAL ASSOCIATION, October 16, 1891.

THE ELEVENTH CENSUS.

BY HON. ROBERT P. PORTER, SUPERINTENDENT OF CENSUS.

Having been invited by the American Statistical Association to prepare a paper upon the "organization, administration, and results of the present census," and, having been particularly cautioned by your secretary not to dwell upon the "census law or past censuses," but to discuss the present census, I shall endeavor to comply with this reasonable request after a few preliminary remarks on another theme.

The eleventh decennial enumeration of the people and wealth of the United States has been completed, and the nation has started on another decade of progress with the usual complaint that the increase should have been greater. The decades ending in 1890 and 1891 have been ominous ones for officials in charge of census work both at home and abroad: the Canadian Parliament trying to overthrow the government because the increase in population was only 11.66 per cent; Englishmen grumbling because the population fell a million short of anticipations; Frenchmen alarmed because the numerical strength of the Republic did not meet their expectations; and your own Superintendent pilloried by patriotic

guessers because the actual count fell a couple of millions short of their estimates. Harassed on the one side by pressure for employment, and on the other by unreasoning and oftentimes ignorant and malicious criticism, importuned at all times by well-meaning specialists anxious to extend their particular inquiries without regard to other work, together with the labor and vexation that attend the placing and handling of sixty thousand persons (for that number took part in one form or another in the Eleventh Census), the Superintendent of the United States Census is likely to experience much hostility during the brief term of his decennial public appearance.

No one understands better than you, gentlemen, how easy it is to assault a great work like the census, but assault is one thing and criticism is another. In the first place, we had to gather together and drill a vast army of raw recruits. Of course, some of them did bad work. How could it be otherwise? General Walker will tell you the same was true of the Tenth Census. A census without error is an impossibility. Especially is this true under the present system of overloaded schedules and temporary organization. When completed, the reports of the Eleventh Census will make not less than twenty-five quarto volumes of 1000 pages each. The amount of detail covered by these volumes is stupendous: the history of 63,000,000 people separately treated; the corporate and other limits of 150,000 minor civil divisions properly adjusted; the financial condition of these same divisions correctly stated; the agricultural, manufacturing, and mining resources of the nation carefully analyzed, and in every case the information obtained from the individual, corporation, or firm; and the amount of the mortgage debts of the people abstracted from the records and obtained direct from millions of people by correspondence. Millions of schedules were tallied twice for the rough count alone. One handling of the population schedules for the purpose of punching the holes chronicled over one thousand million facts.

After this, the 63,000,000 cards with their thousand million statements must each pass through the tabulating machine five times. These are but a few main features of the census work. Would it be surprising, therefore, if people did find a few errors in the census with microscopes? If the same test of fault-finding and carping over minor errors, interviewing and falsifying discharged clerks, and twisting the facts generally, that has been applied to the Eleventh Census, were applied to the *Encyclopædia Britannica*, or Appleton's *Encyclopædia*, untold complaints could be lodged. And why? Because no statistics or honest statements of facts sufficiently simple to be exact for the entire land will ever be sufficient for the wants of local boomers of population, manufactures, mineral resources, or the heralds of our corn crops.

A great part of the criticism of the work of the Census Bureau comes from newspapers in communities where the population did not come up to expectation; where recounts were asked for and refused on good grounds, or where recounts were forced upon the people in spite of protest. Then there are all kinds of boomers who attack the census to justify their own ridiculous estimates: the land boomer, who wants to sell real estate, thinks the population too small; the geological boomer, who wants to get a big appropriation from the state legislature, inflates the value and output of the stone quarries and coal mines of his state. Persons interested in schools and institutions for special classes are quite sure that we have not enumerated all the blind, the insane, the deaf and dumb, etc., because their estimates are put out of joint. The health "boomer" in our large cities usually ignores the census altogether. This was so in 1870 and 1880 in many cities. Fifty or a hundred thousand is calmly added to the census returns, thus deceiving the people in regard to death rates.

It is not my intention to defend the census. Most of you have received the preliminary publications of this Bureau,*

* A list of bulletins already printed will be found in the Appendix.

and they are fair samples of what is being accomplished. The printing of what will comprise the first four or five hundred pages of the population volume is about completed and will be ready before Congress meets. Four final volumes relating to special inquiries (mines and mining; wealth, debt, and taxation; transportation, and Indians) are in the hands of the government printer, and the greater part of the special work will be finished this year. Thus, in a short time the Eleventh Census will vindicate itself. The more criticism, if it be honest and just, the better the census. Where there is public apathy you are far more likely to find poor work through the indifference of subordinates than in localities awake to the importance of the census and jealously watching its results. So far as the Eleventh Census is concerned, I am satisfied that every line of every bulletin has been subjected to the closest microscopic criticism, and by examinations not always conducted in a spirit of fairness.

The preliminary bulletin was used to great advantage ten years ago, but a good printing office, established at the time of the formation of the Census Bureau, has enabled us to make still greater use of this means of speedily reaching the public. Bulletins have been published, or are at present in type, giving the population of every state and territory of the United States by minor civil divisions. This work is really final, though a few minor errors may be discovered before the population volume is finally printed. The aggregate population announced November 26, 1890, has not been changed. In quantity we have published up to date about the same amount of population returns as the Tenth Census, though not exactly in the same shape. On special subjects we are considerably ahead of 1880, the total number of pages of bulletins published being 2378 for the Eleventh Census, as against 196 for the previous census. Profiting by the experience of General Walker, I secured a special appropriation for the printing of the preliminary work. A large proportion of the work has been done in the Census Printing Office. Of course,

minor errors have been found here and there in the enormous amount of special work, but only one bulletin has been withdrawn from circulation. These reports will be strengthened in every possible way in the final volumes, but the result thus far speaks for itself, and does great credit to the experts and special agents who have labored industriously, conscientiously, and with ability to make the census a success. Of the thirty experts and chiefs on whom I have leaned heaviest, at least twenty-three held similar or prominent positions in the Tenth Census. These names will be familiar to your illustrious President, and they are assurance of good work,—a list strong enough to discredit malicious attacks and irresponsible criticism.*

There is not a failure in all the list of experts and specialists; not an inquiry that will have to be abandoned. I would be the last person to maintain that the census in all its branches is absolutely accurate, and you would be the last persons to believe such a statement. It is true, however, that, after making due allowance for the imperfections of the laws, the numerous inquiries dumped into the census office, and the magnitude of the work, results have been obtained decidedly in advance of any preceding census. It is true that, owing to improved methods of tabulation, we shall be able to secure results, especially in the population division, which could not have been obtained in 1880 without the expendi-

* In both the Tenth and Eleventh Censuses are found the names of John S. Billings, Henry Gannett, S. N. D. North, Frederick H. Wines, Frank R. Williams, James H. Blodgett, James H. Wardle, J. C. Stoddard, O. C. Ketcham, Joseph D. Weeks, Henry Bower, Ivan Petroff, Charles A. Jenney, John D. Leland, William A. King, W. H. Olcott, Harry Tiffany, George S. Boudinot, T. C. Purdy, Peter T. Wood, A. E. Shuman, William C. Day, and Charles E. Buell. Among the new strength brought to the work are found the names of A. F. Childs, William C. Hunt, Henry C. Adams, George K. Holmes, John S. Lord, John Hyde, Mortimer Whitehead, Henry K. Carroll, J. K. Upton, Edward Stanwood, Henry T. Cook, Thomas Donaldson, David T. Day, Charles F. Pidgin, Thomas N. Conrad, Frederick H. Newell, J. H. Hale, George A. Priest, Thomas C. McMillan, Allen R. Foote, George W. Graeff, William M. Sweet, Byron Roe, John Birkinbine, Richard P. Rothwell, Charles Kirchhoff, James B. Randol, R. L. Packard, John H. Jones, George F. Kunz, Lyman J. Childs, A. C. Peale, E. W. Parker, Bert Fesler, Charles H. Cooley, Thomas J. Vivian, and Howard Sutherland, every one of whom has reason to feel as proud of the record made in the Eleventh Census as the others do of their records in both the Tenth and Eleventh.

ture of an amount of money far in excess of the appropriation. Comparisons, therefore, that may be made between the Tenth and Eleventh Censuses must not be regarded as criticisms, but merely as showing what has been accomplished by a careful study of General Walker's admirable plans, strengthened by new and better methods of tabulation, restricted as to the study of latent resources of the country and the technology of industry, and by such improvements as experience in the Tenth Census may have suggested. The endeavor has been to make the Eleventh a purely statistical census, dealing only with information called for by law; and although the new investigations added by Congress will make it nearly as bulky as the Tenth Census, the work has been held rigidly within the scope determined upon at the outset, and the plans originally formed have been substantially carried out. We have been dealing only with developed industries. Thus, in the matter of mineral resources, the work of the office was directed to finding the product from existing mines, leaving to the National Geological Survey and the State Geological Surveys the development of the extent of existing coal fields, of iron deposits, etc. Similarly in the matter of timber resources, the extent and value of standing timber, being a subject under examination by the Division of Forestry of the Department of Agriculture, was not taken by the census, but the work in this Bureau was confined to the lumber product and its use in manufactures.

The study of the methods in use in the various branches of art and industry in this plan was not considered a part properly of the census inquiries, and was not touched upon. Similarly the study of soils, and incidentally the surface geology of the country, although of the utmost value of themselves, and especially in their application to agriculture, was not considered as properly falling within the scope of the census.

With these general ideas in view, the following plan for the Eleventh Census was mapped out, and has been adhered to throughout:—

I. POPULATION.	Characteristics, conditions, distribution, and parentage. Occupations.
II. VITAL AND SOCIAL STATISTICS.	Mortality and vital statistics. Social statistics. Statistics of special classes. Pauperism and crime.
III. EDUCATION AND CHURCH STATISTICS.	Education and illiteracy. Religious bodies in the United States.
IV. VALUATION, TAXATION, PUBLIC EXPENDITURES, AND INDEBTEDNESS.	Valuation and taxation. Receipts and expenditures. Indebtedness.
V. FARMS, HOMES, AND MORTGAGES.	Recorded indebtedness. Ownership of farms and homes and indebtedness thereon.
VI. AGRICULTURE.	Irrigation. Tobacco. Farms, cereals, grass lands, and forage crops. The fibers, forestry, and sugar. Live stock on farms and dairy products. Wool and miscellaneous. Horticulture, including truck farming, floriculture, seed farming, nurseries, and tropic and semi-tropic fruits. Viticulture. Live stock on ranges. Live stock not on farms.
VII. MANUFACTURES.	General statistics of manufactures. Statistics of specified industries. Manufactures in cities. Lumber and saw mills, timber products. Slaughtering and meat packing. Chemical manufactures and salt. Clay and pottery products. Coke and glass. Cotton manufactures. Dyeing and finishing of textiles. Electrical industries. Manufactured gas.

MANUFACTURES (continued).

Iron and steel.
Printing, publishing, and periodical press.
Wool manufactures, including woolen goods, worsteds, felt goods, carpets other than rag, wool hats, hosiery, and knit goods.
Ship-building.
Silk and silk goods.
Agricultural implements.
Paper mills.
Boots and shoes.
Leather, tanned and curried.
Brick yards.
Flour and grist mills.
Cheese, butter, and condensed milk factories.
Carriages and wagons.
Leather, patent and enameled.

VIII. MINES AND MINING.

Iron ore.
Gold and silver.
Copper, lead, and zinc.
Quicksilver.
Manganese, petroleum, and natural gas.
Aluminum.
Coal.
Stone.
Precious stones.
Mica.
Mineral waters.
Minor minerals.

IX. FISH AND FISHERIES.

Statistics of fisheries by geographical divisions.
Statistics of fisheries by name.
Scientific and popular names of fishes, with their geographical distribution.
Illustrations of the principal food fishes of the United States.
Condensed description of fish by species.
Statistical summary for each species for the United States.
Directory of principal firms and corporations engaged in the fishing industry of the United States.

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| X. TRANSPORTATION. | Statistics of railroads for the year ending June 30, 1890.
Statistics of railroads for ten years ending in 1889.
Lake, ocean, and river transportation.
Canals.
Transportation on the Pacific coast.
Express business.
Street railways. |
| XI. INSURANCE. | Fire, ocean marine, inland navigation and transportation, and tornado insurance business.
Life insurance, showing the business of level premium, assessment, and co-operative companies.
Miscellaneous insurance, including the business of accident, burglary and theft, guarantee, hail, live stock, plate glass, real estate, title guarantee, steam boiler, surety, and wind-storm insurance companies.
Fraternal and other beneficiary associations. |
| XII. INDIANS. | Report and statistics of the condition of Indians living within the jurisdiction of the United States, 1890, taxed and untaxed. |
| XIII. ALASKA. | Population and resources of Alaska. |
| XIV. VETERANS OF THE CIVIL WAR. | (Seven volumes of 1000 pages each; publication not yet authorized). |
| XV. STATISTICAL ATLAS. | (Publication not yet authorized.) |

While, as I have said, the Eleventh Census will be purely a statistical one, and in this respect has been condensed, in certain other directions the scope of the census was enlarged by several acts of Congress. Prominent among the additional matters touched upon is the ownership of homes and farms, and the amount of mortgages secured by real estate, which were authorized by special act of Congress and special appropriations made therefor.

Certain questions were added to the population schedules which had never before appeared in a national census, such as the number of children born, and number of these living at date of enumeration, questions relating to aliens and naturalization, and ability to speak the English language. The form of the schedule was changed, and for the first time a family schedule was used as a prior schedule to a considerable extent, especially in our large cities. Its use as a prior schedule was carried as far as seemed to be safe and economical. To what extent the prior schedule aided the enumerators in their work I am unable to say, but my impression is that in places where it was used intelligently and methodically it facilitated the work and increased the degree of accuracy. Of course a family schedule means about 20,000,000 separate schedules, and in 1900 will be about 25,000,000, but with mechanical tabulation and ample accommodations they are easily handled until the punching is completed. Then the punched card takes the place of the schedule. The punching was completed in six months, at the rate of from ten to fifteen million cards per month. This finished, we are now running the cards through the machines for the Compendium tally.

By the use of the electric tabulating machines it has become possible in the present census for the first time in the history of statistical work to aggregate from the schedules all the information which appears in any way desirable. Heretofore the amount of such information which could be evolved from the schedules had been limited, especially in the degree of complexity of the tables. It had been possible to obtain related statistics in tabular form only to a limited extent, but with the machine the most complicated tables can be produced at no more expense than the simpler ones. To illustrate this, I need only call attention to the first handling of the cards by the machines after they had been punched, by which we obtain seventy possible combinations of facts as regards general population, six items relating to naturaliza-

tion for foreign white and foreign colored, seven details as to color for the native and foreign colored, and six items as to the ownership of homes and farms, which concerns all householders. The passing the cards through the machine the first time was naturally the most difficult. The clerks were mostly beginners, the error cards rejected by the machines had to be corrected, and the minor civil divisions adjusted. The average number of cards per day per clerk will range from 7000 to 8000 the first time through, and not less than 10,000 per machine for subsequent counts. One hundred machines with one hundred clerks are now tabulating 1,000,000 cards per day. With sixty or seventy possible combinations at each handling, four or five times through the machines will about exhaust the information on the schedules.

From the first handling of these cards we obtain for each enumeration district a primary classification of the population according to native white of native parentage, native white of foreign parentage, foreign white, native colored, and foreign colored. In 1880 no distinction was made for native white as to those of native or foreign parentage. Each of the primary classifications just noted for 1890 is in turn subdivided according to sex and by the following age periods: less than one year; one to four years; five to nine years; ten to seventeen years; eighteen to twenty years; twenty-one to forty-four years; forty-five years and over. For all adult males of foreign birth a classification is also made as regards the number who have been naturalized, have taken out naturalization papers, or are aliens, together with a separate classification as to the number of aliens who cannot speak the English language. In the same way for the native and foreign colored a separate classification is made as regards the number of blacks, mulattoes, quadroons, octoroons, Chinese, Japanese, and Indians. For all householders, also, a separate classification is made as regards the number who hire or own their homes or farms, and if owned, the number of homes or

farms that are free or mortgaged. From the results of this first or preliminary count we shall be able to show by states, counties, cities, wards of cities, and for every municipal corporation in the United States for which a separate return of population was made by the census enumerator, not only the simple statements as to the number of males and females, the number of native born and foreign born, the number of whites, negroes of pure or mixed blood, Chinese, Japanese, and civilized Indians, but all the combinations of facts as regards sex, color, and general nativity for each of the principal divisions of the population as regards age, comprehending children less than one year of age; children under five years of age, of special importance for purposes of vital statistics; the number of children between five and seventeen years of age, or the school age; the number of males between the ages of eighteen and forty-four years, or the natural militia age; the number of males twenty-one years of age and upward representing the potential voting age, and the number of persons over 45 years of age, or the aged sterile classes.

Besides this, very interesting results will be shown by states and for principal cities concerning areas, dwellings, and families, comprehending the total number of families and dwellings, the average number of persons to a family, the average number of persons to a dwelling, the number of persons to a family in detail, as number of families of two, three, or four persons, to the highest number reported; the number of persons to a dwelling in the same manner; and for the larger cities a special classification of the number of families to a dwelling. The only tally in 1880 as regards dwellings and families was by simply counting the number of families and the number of dwellings in the given district, and dividing the total population of that district by the number of families and the number of dwellings, in order to obtain the average size of such families and dwellings.

So much for the first handling of the cards. It is expected that the result of this work will all be in the hands of the public printer before the close of the year.

The subsequent counts of the punched cards, as I have said, may number four or possibly five. They will furnish all the various particulars concerning each individual as regards place of birth in detail by states and foreign countries, ages by single years, occupations, months unemployed in remunerative occupations, foreign parentage, illiteracy, and conjugal condition, besides several new and important features of the present census as regards population. The inquiries concerning foreign-born male adults as to the length of residence in this country, and whether they are naturalized or not, will furnish data in regard to the problem of unrestricted immigration. For all persons ten years of age and over, either of foreign birth or foreign extraction, an inquiry was made as to whether they were able to speak the English language. The results of these inquiries, particularly as regards the alien element of our population, will determine the number who have not yet learned to speak our language. Concerning all married women, also, a new inquiry has been introduced into the census calling for the number of children born to them since marriage and the number of these children now living. This will aid in solving the question as to the relative fecundity of women of various nationalities. The present census law also calls for a subdivision of the colored population into blacks, mulattoes, quadroons, and octoroons. The result of this special requirement can furnish, however, only an approximation at most as to the real facts.

The separate enumeration of the names and service of survivors of the war of the rebellion has also entailed a great deal of labor in the collection, correction, and classification of the results of this special enumeration, comprehending records of from 1,200,000 to 1,500,000 veterans, and which, if published, will occupy seven large quarto volumes of one thousand pages each. At the last session of Congress no provision was made, however, for the printing of this huge directory of surviving veterans of the late war, and until such provision has been made for the continuation of this work no

further steps can be taken toward the completion of the results of this most important and patriotic inquiry. Incidental thereto, however, by means of a special inquiry made on the population schedule, it will be possible to show for all surviving veterans their ages at the time of taking the census, where they were born, where they now reside, in what employments they are found, and what their present mental and physical condition may be; for the widows of such as have died a similar presentation will also be made. This portion of the inquiry will be finished as soon as possible.

In the subsequent counts of the cards the primary classification of the population into native white of native and foreign parents, foreign white, and native and foreign colored, will be observed in all cases. With the exception of the distinction already referred to for native white as regards parentage, the results concerning single years of age and place of birth in detail by states, territories, and foreign countries will not differ essentially from those arrived at in the census of 1880.

The results alluded to as intended to be shown in 1890 were obtained in 1880 by the following tallies: a rough count showing the population by white and colored, by native and foreign, and by male and female. I believe there were also tallied separately Chinese, Japanese, and Indians, where such occurred. Age was tabulated by single years, according to the six following heads: native white male, native white female, foreign white male, foreign white female, colored male, and colored female. From this tally the various tabulations of age, race, and sex were obtained. The birthplace of persons residing in the United States was tabulated according to the forty-seven states and territories for the native born, with the distinction of white and colored, and according to some sixty foreign countries for the foreign born.

For foreign parentage, however, it will be possible in 1890 to show as regards each of these primary subdivisions a classification of birthplace of father in combination with the

birthplace of mother for the following countries: United States, Ireland, Germany, England, Scotland, Wales, Canada (distinguished as to French and English Canadians), Sweden, Norway, Denmark, Bohemia, France, Hungary, Italy, Russia, with a grouping of other countries, and unknown. In 1880 foreign parentage was tabulated, according to what General Walker at that time appropriately termed "a highly complicated form," for a little more than one-half of the entire population, or 26,354,124 out of a total population of 50,155,783, according to whether the person was native or foreign born, and whether the father was born in one of the following seven groups of birthplaces: United States, Ireland, Germany, Great Britain, Scandinavia, British America, and other countries, and according to the same seven groups of birthplaces for the mother. Measured by possible combinations of facts, this means a total of 1620 points in 1890 as against a total of 98 points in 1880.

In 1890 the occupations as returned by the enumerators have been classified under nearly three hundred heads, following in the main the classification used in the Tenth Census, but with certain modifications and amplifications to meet the requirements of the present census. The results regarding occupations will be shown according to the primary subdivisions of population, as already noted, by sex, for the eighteen places of birth referred to under foreign parentage, and for the following age periods: under 15; 15 to 19; 20 to 24; 25 to 34; 35 to 44; 45 to 54; 55 to 59; 60 to 64; and 65 and over. In 1880 occupations were tabulated under two hundred and sixty-five heads, by sex, by three age periods, namely, 10 to 15; 16 to 59; 60 and over; and, according to seven birthplaces, grouped as follows: United States, Ireland, Germany, Great Britain, Scandinavia, British America, and other countries.

Regarding illiteracy, a tabulation will be made for all persons ten years of age and over who can neither read nor write, or who are returned as being unable to write, subdi-

vided according to the five primary divisions of population, by sex, and for ages by quinquennial periods from ten to twenty-five years, by decennial periods from twenty-five to forty-five years, and for those forty-five years and over. In addition, such distinctions will be made as regards place of birth and occupations as may be necessary to determine the nationalities from which the larger part of this element of our population is derived as well as the employments in which they are more commonly found. In 1880 the illiterates were tabulated according to native white, foreign white, and colored, and subdivided by sex according to the following three age periods: 10 to 14; 15 to 20; and 21 and over.

One of the most striking illustrations of the improved methods of tabulation is the fact that General Walker was unable to tabulate conjugal condition even in its simplest form, though full data regarding the same were enumerated. In 1890, however, the conjugal condition of the people will be tabulated, not only as regards native white of native and foreign parentage and foreign white, but for the colored a further separation will be made as regards the blacks, those of mixed blood, and for Chinese, Japanese, and civilized Indians distinguished as to sex and age periods.

In speaking of errors, and they will creep in regardless of every precaution, I am reminded of the fact that the punched-card system provides a far better check against error than the old system of tallying. Every day a careful examination of the cards punched by each clerk was made, and the percentage of errors found that would pass through the machine rarely exceeded a quarter of one per cent. This system of examination comprised the taking of twenty-five to fifty cards at random and comparing them with the schedule.

In the work of punching, three classes of errors are likely to occur: first, the card may be improperly punched, that is, some part of the information necessary to a complete transcript may be omitted; in all cases, however, these cards are invariably rejected by the tabulating machines, and cannot be

counted until the proper corrections have been made; second, the record punched upon the card may be an inconsistent one, as, for instance, a young person less than ten years of age may be recorded on the card as engaged at some remunerative occupation, as farmer, carpenter, etc., which, of course, cannot be the fact, and is an error in punching; such inconsistent transcripts, however, must appear on the result slips when this class of information is tabulated, and will then, as a matter of course, be eliminated; third, the card may be so punched that the error may be said to be a consistent one, that is, the information as punched may not be the exact fact, and still is not inconsistent with the other facts punched on the schedule as regards sex, place of birth, occupation, etc.; for instance, a person's age may be punched twenty-nine years instead of twenty-five years, yet the facts as regards occupation, place of birth, etc., are thoroughly consistent with such record. The latter is the only class of error which cannot be detected by the work of subsequent tabulation. I have every reason to believe, however, that the percentage of this class of error is entirely immaterial, particularly as it is as easy to punch a correct transcript as an incorrect one. And the reason for this belief is the fact that thus far, and we have run more than half the cards through the machines, the two classes of errors which can be detected average only a little more than one per cent of the total number of cards counted. In this connection it must be understood that of this percentage of error more than three-fourths is made up of omissions to punch one or more holes out of an average of from fourteen to seventeen holes to each card and less than one-fourth of incorrectly punched holes, this estimate being based upon a very careful examination of over 200,000 cards to determine the classes of error most commonly made. Another point should also be stated. As I have just mentioned, in each punched card from fourteen to seventeen holes were necessary to represent all the information returned on the population schedule concerning each person enumerated, so that, if,

instead of basing the percentage of error, whether of omission or commission, upon the actual number of cards rejected, as has been done, it should be determined by the relation which the number of holes omitted or improperly punched bears to the whole number of holes punched in all the cards, the percentage of error discovered and corrected becomes hardly worthy of serious consideration, that is, less than one-fifteenth of one per cent. It is not likely, therefore, that the errors that go undetected are consequential. The only way to insure absolute accuracy would be to compare every card, the cost of which would be so great that it would be folly to undertake it. With ordinary care and with additional checks the transcription of data has been undoubtedly as accurate, if not more accurate, than in previous censuses.*

The electrical tabulating system has not only been used by the Population Division but by Dr. Billings in tabulating the vital statistics, and by Mr. Wines in tabulating the statistics of pauperism and crime. As I shall show later on, the latter report is nearly completed, and will be ready for the printer in a few months. In speaking of his experience with the card system, Mr. Wines recently said:—

“The essential difference between the Eleventh Census and that which preceded it was the adoption of the card system for the tallying of results, and the use of the newly invented Hollerith electrical machine for counting the cards. Too much can scarcely be said in praise of this machine, which has enabled us to compute results with much greater rapidity and accuracy than by the old method of tallying, besides giving the opportunity to make a much more thorough analysis of the figures.

“One who has not had personal experience in handling cards prepared as these have been cannot conceive the stimulating effect which they have upon the imagination of a statistical computer. They become endowed in his fancy with all the attributes of living beings,

* In closing these remarks relating to the population work I cannot speak too highly of the assistance I have received from Mr. William C. Hunt, of your city, special agent in charge of population. Much of the credit for the thoroughness of the work and the promptitude with which it has been done belongs to him.

whose life experience is written upon their face in hieroglyphic symbols resembling in significance the traits of the human countenance. A card which means nothing to the uninitiated is converted into a pauper or a criminal, whose sin and suffering are as palpable as if the man himself were bodily present in the room. The groups into which they are cast are like the divisions of an army from the corps to the battalion. Under the mysterious influence of the electric current running through the machine, they organize themselves, as though possessed of volition, into these groups and sub-groups, with a precision superior to that shown in any movement of disciplined troops at the word of military command. I can compare this current to nothing less intelligent and powerful than the voice of the archangel, which, it is said, will call the dead to life and summon every human soul to face his final doom.

"The first advantage of the Hollerith system is the more than stenographic celerity with which the record of each individual enumerated is transferred from the original schedule to the cards for tallying. Instead of the multiplied motions required in transcription by the ordinary process of writing, one turn of the wrist suffices for the recording of each reported fact. If some time is lost in placing the cards in position in the punching machine, on the other hand the record does not require so many independent physical movements as are necessary even in stenographic writing, where each line represents a sound.

"In the next place, the entire record for each individual is on a single card, and once made can never be changed. Under the old system of tallying by check marks employed in the Tenth Census recourse had to be had to the original schedule for each successive tally, and if the results in one tally did not correspond to those obtained in another, the work had to be done over. Under the new system, when the cards are once correctly punched, the schedules are put away forever, and there is no chance for any disagreement between one tally and another. In the Tenth Census all work was done in duplicate, by two sets of clerks, and the results compared for the sake of accuracy and certainty; in the Eleventh Census this duplicate proof has been rendered needless, thus saving both time and money.

"The limitation in usefulness of the punched cards is due to the impossibility of increasing the number of holes on the punching plate, which are insufficient to admit of a complete analysis of all the re-

corded facts. Practically, however, this analysis can be carried as far as the limitation of cost of the census will allow.

"But the great superiority of the present system consists in the substitution of a purely mechanical method of counting for the tedious and trying Seaton slips of paper, on which the tally was made by pencil marks. It saves the eyes of the tallyist, reduces the number of tally clerks required, relieves them of the difficult task of actual counting, and avoids the possibility of errors arising from their weariness or inattention. The work which they do becomes sooner or later purely automatic, and the speed which they attain by practice, if adapted to it, is wonderful. Under that system groups of co-ordinated facts are as easily and quickly tallied as single facts, and that without any demand on the intellectual faculties of the tallyist. The possibilities of new combinations in tabulation without extra cost are enormously increased.

"Besides, the sorting-boxes attached to the machine, which are operated by an independent electrical current, enable the statistician to tie up the cards in separate bundles, which are not disturbed until their usefulness is at an end, and then a new arrangement of the cards is practicable, which can be retained as long as expediency dictates. For example, I have at the present moment 273,455 punched cards, namely, 82,329 prisoners, 73,045 paupers in almshouses, 14,846 inmates of juvenile reformatories, and 113,235 inmates of benevolent institutions. These have all been sorted, first into the five geographical groups of states, according to the plan adopted for all census work; then into the elements of the population for each group, namely, natives with both parents native, father native, mother native, both parents foreign, one or both parents unknown, foreign born, persons whose birthplace is not stated, negroes, Chinese, Japanese, and Indians. This analysis has been maintained throughout the whole of the work of the eighth division, and will be maintained to the end. Then I have taken the prisoners and subdivided these groups, for that class, according to groups of criminal charges preferred against them, such as larceny, burglary, arson, homicide, etc. I could, had I preferred it, have divided them by ages or by length of sentences imposed, or in any other way. The final outcome of my studies will show that the opportunity to preserve these groupings intact has been of the greatest service in facilitating a more thorough analysis than would otherwise have been possible; and, besides, there is no room for questioning the

accuracy of each table evolved since the results obtained at each successive step must correspond in the aggregate, figure for figure, with those obtained at each previous stage of the entire process, and an error cannot occur which will not infallibly be detected."

This would seem to dispose of all questions as to the accuracy of the method, while the speed and economy is also demonstrable.

VITAL STATISTICS.

Next in importance to the count of the people are the vital statistics and the statistics of the special classes; for after we know the number of our population, its characteristics, distribution, and parentage, the question of its health and physical condition naturally comes up for consideration. The Census Office was fortunate, therefore, in securing the services of that eminent authority on all matters appertaining to vital statistics, Dr. John S. Billings, surgeon United States Army, whose report for the Tenth Census was far in advance of anything ever attempted in this direction before.

The great importance of complete and accurate records of vital statistics, including marriages, births, and deaths, is becoming more and more recognized in this country. Such records are the absolutely necessary foundation for well-directed attempts to improve the health and lengthen the life of the people; to increase the productive efficiency of the workers; and to form a sound basis for the enormous money interests involved in the business of life insurance. The great majority of the states have still no satisfactory system for registration of vital statistics, although most of them are slowly advancing in this respect.

The accurate collection of statistics of mortality by means of the regular census enumerators is perhaps the most difficult undertaking imposed on the Census Office. Any efforts to secure a statement of facts concerning the deaths occurring in any locality during the year preceding the date on which the inquiry is made will necessarily fall short of securing a complete return. This fact has been well understood, and

every effort made to supply deficiencies that could be successfully carried out. The most reliable data are obtained from those localities in which local laws require the registration of each death at the time it occurs, and wherever the facts so recorded furnished sufficient data for the use of this office copies have been made of the registration records. This has been done to a much greater extent than in any previous census.

The great advantage of the system of tabulation adopted and already referred to lies in the fact that it is possible under that system to make an entirely accurate compilation of the data collected, inasmuch as the whole record in each case is kept upon one card, which is used in all the subsequent steps, and which is identified with the case it represents by a number, permitting quick reference to the original record in case of any discrepancy or inconsistency appearing in the results, a feature which is not possible under any system of tabulation involving the use of tally sheets.

The most important new features of work in this direction are as follows:—

1. A special study of the birth and death rates, and of the principal causes of death in twenty-four of our largest cities, to show where the highest and lowest death rates prevail, and what the relations of these are to topography, drainage, character of habitations, overcrowding, poverty, and other environments.

2. A special study of the influence of race upon fecundity and mortality, including studies of the birth and death rates of mulattoes as distinguished from negroes on the one hand and whites on the other, and of the principal European races which have contributed to the population of this country.

3. A special study of the relations of occupation to death rates and to particular causes of death, as shown by a detailed study of figures derived from the records of our largest manufacturing cities for a period of five years, in addition to the data of the whole country for the census year, which were obtained by the enumerators.

The records obtained from states and cities maintaining a compulsory system of registration of deaths are much larger than those obtained in previous censuses, and cover an aggregate population of over 17,000,000. The death records of this population for the census year in the state of New Jersey, in New York city, Brooklyn, Richmond county, Westchester county, Kings county, and part of Queens county (New York), and in Boston, Philadelphia, Baltimore, and the District of Columbia, and for a somewhat lesser period of time in Chicago, St. Louis, and Cincinnati, have been tabulated. The total number of deaths thus recorded, the records of which are especially accurate and complete, is 740,884. These records, in connection with those for the census year, furnish a continuous record of deaths for these localities for a period of six years, which will afford more reliable information than anything which has heretofore been published with regard to the vital statistics of this country.

Dr. Billings likewise has charge of the statistics relating to the insane, feeble-minded, deaf, and blind, classified in the Eleventh Census under the head of "Special Classes." A comparison with the returns of 1880 indicates that the enumeration of these classes has been upon the whole satisfactory, and the treatment of the returns will be substantially the same as ten years ago.

SOCIAL STATISTICS OF CITIES.

I have not attempted such an elaborate report on the social statistics of cities as that inaugurated in 1880 by Colonel George E. Waring. Still, the subject was important, and it seemed a pity to omit it altogether. It was therefore decided to make a statistical report on this subject, and the results have been highly satisfactory, and the work is now substantially completed.

Nearly all the information for the treatment of social statistics of cities has been collected through the several city officials, mostly without expense other than clerical work.

Letters explaining the scope of the work were sent to all places having a population of 10,000 and upward, and the several chief executives were asked to co-operate with this office to enable their cities to have a full representation in the final report. Schedules were then prepared covering all points to be treated, and so divided that each one could be referred to the officer having jurisdiction of the subject to which it pertained. There were twelve schedules covering the following points: Altitude, Cemeteries, Drainage, Fire, Government, Licenses, Parks, Police, Public Buildings, Streets, Street Lighting, and Water Works. The railroad statistics, including suburban travel, were obtained directly from the officers of the roads. Bulletin No. 100 shows the manner in which all cities will be treated in the final report.

Apart from showing the conditions surrounding the inhabitants of cities of 10,000 population and upward, this inquiry presents in concise form the cost of all municipal improvements. Owing to its purely statistical treatment, it will form a solid basis for subsequent investigation on the same line, but no comparison can be made with the work of Colonel Waring because the volumes of the Tenth Census did not give sufficient statistical data.

PAUPERISM AND CRIME.

As to securing information relating to pauperism and crime for tabulation, there was no essential difference between the Tenth and Eleventh Censuses. Schedules were sent to the larger institutions to be filled by the officers in charge, and for the smaller institutions reliance was placed upon the regular enumerators. The inquiries contained in these schedules were for the most part identical with those ten years ago, though some new questions were added, and the forms of the schedules were, in my judgment, materially improved. A new feature of the Eleventh Census, however, was the appointment of institution enumerators selected by the authorities in charge of the institutions, and the payment of such enumera-

tors, a method which was found to work admirably in practice. The same plan was adopted with all benevolent institutions. In this way we secured three or four thousand of the very best equipped persons as enumerators for a class of work that would be difficult for ordinary enumerators to perform.

The statistics of crime, defect, and misfortune are like the record of thermometric and barometric observations in meteorology, or like the varying movements of the needle which indicates the pressure of steam in the boiler. It is matter for congratulation that the figures for 1890 when compared with those for 1880 show no alarming growth of these evils during the past decade. The number of prisoners returned in 1880 was 58,609; in 1890 it was 82,329, an apparent increase of 40 per cent against an increase of a little less than 25 per cent in the population at large. But an examination of the figures shows that this relative increase has been in the population of our minor prisons, not of our penitentiaries, and it does not indicate any greater prevalence of serious crime; indeed, it may be due merely to greater care and severity in dealing with disorder and petty misdemeanors. The number of paupers in almshouses returned in 1880 was 66,203; in 1890 it was 73,045, an increase of only about 10 per cent, or less than half what might have been anticipated. The number of juvenile delinquents in custody in 1880 was 11,468; in 1890 it was 14,846, an increase of between 29 and 30 per cent, or very nearly the same as that of the total population. The slight excess is an encouraging fact, since it shows a growing disposition to rescue young offenders from a criminal career.

In Bulletin No. 90, relating to the almshouse population, a table is published, by way of appendix, which shows the number of outdoor paupers found and returned by the census enumerators. These figures have been much misunderstood and misrepresented by persons who have failed to apprehend the fact that no statistics of outdoor relief can be procured through the agency of the enumerators, for the obvious rea-

son that they cannot ask at every house whether any of the members of the household are paupers. Their local knowledge enables them to report a few of this class. Both in the census of 1880 and 1890 such information as has been obtained in this way has been given to the public, chiefly for the purpose of demonstrating the futility of any effort in this direction. But it should be known and understood that probably not one outdoor pauper in ten ever has been or ever will be discovered and reported by the census enumerators.

EDUCATION.

Education was a subject of National Census inquiry for the first time in 1840, fifty years ago, when in no entire state but the commonwealth of Massachusetts were public schools and free schools synonymous. The change that almost immediately after that census set up the Union Free School as a standard in a town of New York swept on across the new states of the West, but was compelled to jump over Indiana for the time by an adverse judicial decision. Since the Civil War, however, almost the whole Union has come into line for local taxation to secure the support of public schools. The public provision has widened for superior and secondary as well as for elementary education, although it is not so strikingly evident in a state whose early policy foreshadowed what we now see as in the nation at large, embracing states which for years depended mainly upon private interests for the education of the people. Without pausing to dilate upon the township land grants in all the new states for elementary schools and the special endowments of the agricultural colleges, the records show a more rapid growth of school enrollment than of population, indicating how vital an interest this is to the people. The general conditions for each decade of pupils enrolled in schools, exclusive of special classes, reformatory, charitable, and Indian schools, appear to be as follows:—

•	1840	1850	1860	1870	1880	1890
Population.....	17,069,453	23,191,876	31,443,321	38,558,371	50,156,783	62,622,250
All schools.....	2,025,656	3,642,694	5,477,037	7,210,420	.....	14,372,683 (a)
Primary and common, 1840, public, 1850, etc.	1,845,264	3,354,173	4,955,894	6,228,060	9,951,608	12,707,683

(a) Including private and parochial, each 800,000; advanced public, 65,000.

Education has not only been a dominant consideration with the philanthropist and moralist, but also with the statesman and the economist, so much are public policy and public energy involved in its administration.

The conditions point out two distinct lines of census inquiry on education. The population schedules embodied questions as to age, sex, maternal nativity, occupation, in which attendance at school as teacher or pupil is included, and illiteracy, from which could be derived tables showing the amount of time used in teaching, or by children as pupils, as well as an analysis of the conditions of occupations and nativity of illiterates.

Much is said of school age. It is to be remembered that school age pertains to state laws, and that there is no national school age. The state laws vary so greatly on this point that it is better for a national census to give the facts for each year from four years, the minimum in any state, to twenty-one years, the maximum in any state. Individual states can then derive from the national reports such facts as are useful under their own laws. The items above named have never been sought except to a very limited extent by any authority other than a national or a state census, and for the country as a whole by a census only. Few states have yet taken a separate census. The more stress is to be laid upon this matter as, in the discussion as to what is desirable for the future for the Census Office, some have presumed that educational statistics were available without the census. It is to be emphasized that except through the decennial national census no statistics of national illiteracy have hitherto

been available. These conditions, as shown by the population schedules, are being tabulated as rapidly as possible.

There is another line of inquiry which ought to be readily handled, and educators and school officers should see to it that it may become comparatively easy for even a private individual to gather the facts for his own satisfaction in any year. This line of inquiry is the reports of the institutions as distinguished from the statements by the heads of families. It is now a laborious inquiry, not altogether satisfactory, because of the exceeding diversity of records. It should be so light a work that any state could afford to give an outline table of attendance for the Union from its exchanges with other states, occupying a small space, and to make a comparative view for its citizens in any regular report. It is now, however, no light work to gather even the public-school enrollment.

Taking warning from the fate of educational statistics in the Tenth Census which largely failed of publication, it was determined to confine the inquiries in the Eleventh Census to a small number of essential questions most readily answered, the results of which would be capable of being most promptly prepared for publication. The schedules sent out for the public common schools, therefore, asked only for the number, sex, and color of the teachers and pupils, and a separate statement for those in high schools. Simple as this schedule was, it was necessary to send thousands of inquiries to local officials in some of the states because the ordinary report took no account of sex or color. Even number is not a simple matter in practice, whatever it may seem in theory. In some cases the promotions, re-enrollment, and transfers within the year all went to swell the annual enrollment, while in other cases all such duplications were carefully excluded, most completely of all the states by the commissioner of common schools for Rhode Island. Sex was omitted from the usual reports of twenty states at the organization of the census; the chief officials in seven of these were

able to adjust their reports for the census year so as to report sex. There is an idea prevailing in certain quarters that number is the only essential item. Passing by the important question whether more boys or more girls are occupied in wage labor,—a fact which disturbs the balance of the sexes in elementary schools,—we find in the state of Massachusetts a little over 25,000 pupils in public high schools. It is well known to those who have paid special attention to the subject that in the country at large girls greatly predominate over boys in high schools. Now, it is a question of consequence whether the high schools of Massachusetts are equably educating the young people or whether they tend to become young ladies' seminaries, yet the attendance by sex is not a matter of state record. In the nation color becomes an important item as a superficial indication of race, though in large portions of the country one race is almost absolutely prevalent to the exclusion of others.

Here in Massachusetts it was not presumed that a teacher would find it difficult to make a suitable estimate of the sex of his pupils and of the few colored enrolled in the census year from his knowledge of changes by the time inquiries reached him. The press has rendered invaluable aid to the census, and so to the community, and it was by the criticism of an enterprising Boston daily upon the inadequate showing in a census bulletin of the reports on color in the schools, furnished by the local authorities, that something like a fair statement of the colored enrollment was at last secured for Massachusetts. The criticism of the newspaper led some officials even to send corrections for their original reports. The fullness and accuracy of reports of institutions depend on school officials. If the records are defective, no inquiry after the year is ended can be readily answered, and so for all institutional reports the first essential is completeness of the leading particulars of record. If the local records are properly made and preserved, their compilation into state and national tables will be a very simple and easy matter, not very burdensome upon any bureau that may do the work.

In the absence of anything like a uniformity of record of attendance, it was deemed wholly impracticable to secure the exceedingly important item of effective attendance which could be expressed by the aggregate number of days' attendance of all pupils. It is in evidence of the labor that the general statistics of school enrollment for the census year throughout the country are not yet available to the public except through census publications, and it is in evidence of the energy with which the work has been pushed by Professor Blodgett that the facts are available to the public at so early a date. The final results, with very slight allowance for additions to private and parochial schools, will show close to fourteen and a quarter million pupils in all schools, including nearly eight hundred thousand in private schools, and a like number in the subdivision of parochial schools.

To be definite, the enrollment in the common schools of the United States in the Eleventh Census year will not vary appreciably from the following statement:—

	Total.	White.	Colored.
Teachers.....	361,781	337,740	24,041
Pupils.....	12,707,683	11,350,587	1,357,096

The office has occasion to recognize an almost universal, hearty, and cordial co-operation by public and private school officers and managers of parochial schools.

CHURCHES.

It is undoubtedly true that for the first time the United States Census has secured complete church statistics. By limiting the number of questions, and by the most persistent and voluminous correspondence, we have nearly finished the work of showing by counties the number of church communicants in something like 130 different religious denominations and their several branches. These statistics have been

gathered expressly for the Eleventh Census. None have been copied from printed reports, except so far as those reporting for districts, or associations, or conferences, may have used printed matter when other sources of inquiry failed. The plan adopted was to secure the statistics desired through the clerks of the various ecclesiastical sub-divisions. In churches having the presbyterian form of government the stated clerks of presbyteries were requested to gather, by the use of printed circulars, the statistics from the churches within their jurisdiction, enter the results in schedules, and forward them to the Census Office. In churches having the episcopal form of government this work was placed in the hands of the secretary or bishop of the diocese. In churches having annual conferences, like the Methodist Episcopal, the presiding elders of districts, who visit all their churches once every quarter, were commissioned to obtain the desired information. In denominations having no ecclesiastical conferences or associations, like the Unitarians, each pastor was communicated with directly. I may say that this plan has worked admirably. It would have been impossible to communicate with all pastors direct, because in many churches these change their location very frequently, new congregations are being constantly organized, and reports obtained in this way would be necessarily incomplete. Each stated clerk of presbytery, secretary of diocese or association, or presiding elder of district, knows intimately all the congregations within his jurisdiction, and this fact insures complete and intelligent reports. The number of secretaries, stated clerks, and presiding elders who have assisted in this way in obtaining statistics is very large. Many of the denominations for which full returns have been obtained never gave to the public before any statistics whatever.

The following returns have been tabulated and are already printed in bulletin form:—

1ST BULLETIN: Advent Christians; Evangelical Adventists; Life and Advent Union; Baptists; Seventh-Day; Seventh-Day German; Six Principle; Brethren in Christ, or River Brethren; Catholic Apostolic; Christian Church, South; Church of the New Jerusalem

(Swedenborgian); United Presbyterian; Salvation Army; Schwenkfeldians; Theosophical Society.

2ND BULLETIN: Brethren (Plymouth); Church of Jesus Christ of Latter-Day Saints (Mormons); German Evangelical Protestant Church; German Evangelical Synod; Moravian (Unitas Fratrum); Cumberland Presbyterian; Reformed Episcopal.

3RD BULLETIN: Armenian Catholics; Greek Orthodox Church; Greek Catholic Church (Uniates); Old Catholic Church; Reformed or Converted Catholic Church; Roman Catholic Church; Russian Orthodox Church.

4TH BULLETIN: Mennonite; Bruederhoef; Amiah; Old Amiah; Apostolic; Reformed; General Conference; Church of God in Christ; Old Wisler; Bundes Conference; Defenceless Brethren; Dunkards (Conservative); Dunkards (Progressive); African Methodist Episcopal; Wesleyan Methodist; African Union Methodist Protestant; Independent Churches in Christian Union; Temple Society; Church of God; Reorganized Church of Jesus Christ of Latter-Day Saints; Shakers; Amana Society; Harmony Society; Society of Separatists; New Icaria; Altruists.

5TH BULLETIN: Lutheran; General Synod; United Synod in the South; General Council; Synodical Conference; Joint Synod of Ohio and other States; Buffalo; Hauge's; Norwegian; Michigan; Danish Lutheran Church in America; German Augsburg; Danish Lutheran Church Association; Icelandic; Immanuel; Suomal; United Norwegian; Independent Congregations.

The following returns for two bulletins are in course of tabulation:—

Associate Church of North America; Associate Reformed Presbyterian Synod of the South; Bible Christians; Christian Connection; Disciples of Christ; Disciples of Christ (Colored); Cumberland Presbyterian Church (Colored); Friends; Orthodox, Wilburite, Hickite, Primitive; Hebrews: Orthodox, Reformed, Hebrew Christians; Independent Methodist; Reformed Church in America; Reformed Presbyterian Church of North America (General Synod); Reformed Presbyterian Church in the United States (Synod); Reformed Covenantant; Reformed Presbyterian Church (Pittsburg Presbytery); Social Brethren; Society of Ethical Culture; Spiritualists; Union American Methodist Episcopal; Welsh Calvinistic; United Zion's Children; Confucianists; Christian Reformed Church in the United States; Seventh-Day Adventist.

Church of God (Age to Come); Baptist; (Regular); Baptist (Regular, Colored); Baptist (General); Baptist (Primitive); Baptist (Primitive, Colored); Baptist (Original Freewill); Baptist (Free); Baptist (General Freewill); Brethren (Owen's); Brethren (Whelpley); Brethren (Old Order); Christian Scientist; Church of God in Christ Jesus; Church Triumphant; Church Triumphant (Korehan Ecclesia); Congregationalist; Evangelical Association; Congregational Methodist; Free Methodist; Methodist Episcopal (South); Methodist Episcopal; Primitive Methodist; Colored Methodist Episcopal; African Methodist Episcopal Zion Church; Methodist Protestant; Presbyterian Church in the United States; Presbyterian Church in the United States of America; Protestant Episcopal; United Brethren; United Brethren (Old Constitution); Unitarians; Universalists.

WEALTH, DEBT, AND TAXATION.

The work of the Wealth, Debt, and Taxation Division of the census has been modelled after the work of 1880, which I had the honor to compile under the direction of General Walker. The debt work is now completed and in the hands of the printer, and I hope to have the completed volume out early in 1892. Except in the matter of receipts and expendi-

tures, the scope of the work for 1890 is not much greater in extent than it was for 1880, but the work itself is far more exhaustive in detail. In 1880 the debt of only 27 foreign nations was compiled, and these from unofficial sources. In 1890 full official details will be published of 81 countries, with per capita computation. The debt of the United States is also stated more in detail in 1890 than in 1880, and with it is shown the paper and coin circulation, which was not shown in 1880. In 1880 the debt of the states of the United States, as published, showed few if any details, and no account was taken of the funds held by the states, either in amount or character. For 1890 complete details of every outstanding loan and of all funds on hand will be shown for each year from 1880 to 1890. The municipal and school district debt was not published in detail in 1880, except for New England. In 1890 every place that has a debt will be reported.

In 1880 the receipts and expenditures of only 310 municipalities, being those having a population of 7500 or upward, were shown. In 1890 not only will the expenditures of these cities be shown, but the receipts and expenditures of the states for ten years in detail, of all the counties where information can be obtained, of all municipalities having a population of 4000 or upward, probably more than 1000 in number, and of all the school districts in the United States by counties.

In 1880 no details of valuation of cities less than those having a population of 7500 were shown, except in New England, Michigan, New York, Pennsylvania, and New Jersey, and in the three latter the details of taxation were not shown.

In the Eleventh Census, 1890, the valuation and taxation of every place in the country having a population of 1000 or upward will be published, and probably in New England, New York, and Pennsylvania every place with a debt-creating and taxing power. Speaking as the author of the work ten years ago, I do not hesitate to say it will be in every respect a far more valuable and complete report.

MORTGAGE INDEBTEDNESS.

I have now come to a novel feature of the census. It has cost nearly a million dollars thus far to collect the statistics of mortgage indebtedness of individuals and private corporations throughout the United States. That seems like a large sum of money; but it will take, as I informed the committee of both Houses of Congress when the matter was under consideration, at least another half million dollars to finish the investigation.

Did Congress act wisely in appropriating a million dollars to carry on this investigation, especially when the committee was informed at the time that certainly half a million more, and possibly another million, would be required to finish the investigation? It was not a hesitating act. Both parties voted for it. In the Senate, I believe, but four votes were cast against the bill, and in the House of Representatives not over twenty-five negative votes were recorded. It was a novel, not to say a bold, step in statistical inquiry. Old statisticians shook their heads and said the obstacles in the way of such an investigation were too great to overcome. All over the country could be heard murmurings of discontent and declarations that the people of the United States would never submit to such an inquisitorial inquiry into their private affairs. Reckless newspapers made this investigation, forced upon the Census Office in spite of repeated protests by almost a unanimous vote in both Houses of Congress, an excuse for attacks upon the whole census, and called upon the people to resist the enumerators, if necessary, with force. The difficulties of the Census Office were increased by this action. This novel inquiry had been ordered on the very eve of sending out the population schedules. Those schedules were complete, and the public printer was ready to start the printing of 25,000,000, the probable number required. No time could be lost. To put questions in the population schedules, asking every individual in the United States the amount of the mortgage on his farm or home, the motive for contracting

the debt, and the value of his property, would have swamped the constitutional enumeration of the people. The amount of irritation which would have been aroused had this course been adopted cannot be estimated. The enumeration of the people would have been endangered, and for no purpose, because, in the very nature of things, the enumerators would have failed in half the cases to obtain the desired information about mortgages. The accepted theory of the census is that the enumerators see personally about one in every seven of the inhabitants. Already the population schedule of the census was bowed down with the burden of a double yoke. There were twice as many questions as should have been propounded before those relating to mortgages were added. These questions, however, were made as easy as possible by throwing out all reference to the amount of the indebtedness, interest, value of property, etc., and confining them to a simple inquiry as to whether the farm or home was owned or rented, and, if owned, whether free from debt or incumbered by a mortgage. If unable to ascertain whether a home was mortgaged or not, the enumerator was instructed to give the full name and address of the owner, and in subsequent correspondence the Census Office assumed that the property was mortgaged until otherwise informed. This solution proved a practical one, and has formed a basis of one of the most valuable and interesting investigations ever undertaken by any government. While the addition of these and other questions, such as those relating to the veterans of the late war and other inquiries, increased the cost and added to the difficulties of the constitutional enumeration, and while my individual voice will always be raised against thus overloading the population schedule with special inquiries, I am satisfied that, owing to the high character of the supervisors and the faithfulness and intelligence of the vast body of enumerators, the enumeration of the people did not suffer to any serious extent. At the same time Congress should in future legislation simplify the population schedule, and relegate all

questions relating to special inquiries to other schedules to be subsequently filled out by special agents or by enumerators employed by the day. From a statistical standpoint, the work of collecting information in regard to mortgage indebtedness has been prosecuted with a success far beyond the anticipation of statisticians who have studied the question for years. At the present writing, it is impossible to estimate the full benefits which will be derived from such an investigation. The employment of a small army of 2500 special agents and clerks to make an abstract of every mortgage placed on record throughout the United States for the last ten years has attracted attention to the dangers of these incumbrances, to the enormous burdens in the way of interest, to the alarming extent to which usury is practiced, and to the defectiveness of these records in all parts of the country. The agents of the Census Office have, as I have said, overhauled the records in every state and territory. They have travelled on horseback and on foot through the most sparsely settled districts of our vast domain in search of mortgages, and have done their work so industriously and so thoroughly that we now have on file in Washington as a result of their labor the abstracts of about nine million mortgages. Some months before the inquiry was begun Congress, and through Congress the public, was put in possession of the scope of the plan adopted. That plan, with hardly any change, has been successfully carried out. It comprised two distinct methods, one having the local records for the basis of operation, the other the population schedule, and hence the individual.

The two important features brought out in this inquiry are the amount of mortgages placed on record each year for ten years and the amount of the existing debt. It would, of course, be absurd to accept the amount of the uncanceled mortgages as the amount of debt in force. Such an exhibit would manifestly be a gross exaggeration unworthy of confidence. The extent of this defect in the records has been

ascertained by the Census Office in one hundred and two counties representing all parts of the country, and in sixty-one of these counties that have been tabulated the face of the uncanceled records exaggerates on the average the true amount of the debt by 71 per cent. It was therefore decided to make a transcript of the record in every case for ten years, and ascertain therefrom the average life of a mortgage.

Preliminary experiments by special agents of the Census Office pointed to the use of the average life of mortgages, with an allowance for partial payments, as promising results much nearer the truth, near enough at any rate to be fairly conclusive as to the amount of existing indebtedness. This plan is approximately correct, and under perfectly uniform conditions would produce accurate results. An objection that can be raised against it is that mortgages are not uniform in amount and number recorded each year. These variations, however, when large amounts of debt are considered, are not as great as may be supposed, and under careful observation and corrective treatment lose much of their influence for error. If the average life of all mortgages under such circumstances is four years, and the total amount of the mortgages recorded within the last four years is taken as equivalent to the amount of indebtedness existing at the present time, it is evident that many paid mortgages created within the four years are included within the amount, and that many unpaid mortgages created more than four years ago are not included. In such cases it is true, if the average life of mortgages is correctly represented, that the mortgages of the life period of four years now paid are exactly equal to the mortgages made previously to the life period and now unpaid, so that the total recorded debt of the life period stands for the amount of debt in force.

Our agents were therefore instructed to transcribe for every real-estate mortgage acknowledged and received within the ten years ended December 31, 1889 (except mortgages made by public and quasi-public corporations), the following

facts: the state and county in which the mortgaged real estate is situated; the year in which the acknowledgment was made; corporations, both as mortgagors and mortgagees, classified as savings banks, banks (including loan and trust companies, but not including savings banks), building and loan associations, insurance companies, mortgage corporations, and all other; the original amount of the debt; the actual rate of interest, or, if not ascertainable from records, the customary rate at the time; the number of incumbered acres and city or village lots; and, also, for the cancelled mortgages of 1880-83, the full dates of acknowledgment and cancellation. For the purpose of checking this inquiry special investigations were conducted in 102 counties well distributed throughout the United States, and representing every phase of American life and industry. In these counties the same facts were taken from the records as in other counties, and also for all uncanceled mortgages as far back in time as any appreciable number of them was found in force, the names and addresses of the parties. Schedules were sent these persons, and in each one of these counties an exact statement of existing debt has been compiled. The enormous cost would preclude this method for the whole country, but work in what is termed "inquiry" counties has been of great service in correcting the work elsewhere. The "inquiry" counties also reveal the purposes for which the debt was incurred. By far the largest proportion of real-estate mortgage debt has been incurred to secure the purchase of land, and the cost of improvements stands second in importance. The security of purchase money is generally 50 to 75 per cent of the real-estate mortgage debt of the people of a county, and improvements generally represent from 10 to 20 per cent of the debt.

The following table summarizes the results of this inquiry as far as possible to date: —

	Alabama.	Iowa.	Kansas.	Tennessee.	Illinois.
Number of mortgages recorded during 1890-99	93,628	520,448	654,243	93,283	612,249
Amount of mortgages recorded during 1890-99	\$91,099,623	\$439,936,364	\$496,653,903	\$100,212,257	\$870,699,940
Number of mortgages in force Jan. 1, 1890	35,331	252,539	286,890	33,470	297,247
Amount of mortgages in force Jan. 1, 1890	\$39,027,983	\$199,774,171	\$243,146,826	\$40,421,396	\$384,299,190
Number of acres incumbered Jan. 1, 1890	6,008,636	16,312,176	26,590,795	3,035,816	10,761,244
Number of lots incumbered Jan. 1, 1890	14,213	163,712	265,462	32,957	287,378
Number of acres incumbered during 1890-99	16,175,153	33,864,721	58,510,069	7,269,279	21,578,919
Number of lots incumbered during 1890-99	34,649	303,566	544,934	65,566	602,162
Percentages of debt recorded 1890-99 in force Jan. 1, 1890.	42.84	45.41	48.76	40.34	44.14
Percentages of assessed acres incumbered Jan. 1, 1890.	21.67	46.49	61.59	11.72	31.04
Equated life of mortgages (in years)	2.73	4.92	3.36	2.81	4.02
Range of interest rates (per cent)	1.40	1.20	1.60	1.12	1.18
Amount per capita of mortgages in force Jan. 1, 1890	\$26	\$104	\$170	\$23	\$100

So much for the inquiry relating to recorded real-estate indebtedness. The result of the direct inquiry as to the debt on farms and homes is not yet complete. The average farm and home debt, shown by tabulation of partial returns from counties distributed throughout the Union is \$1288 for farms and \$924 for homes. If these averages hold good for the United States, there is an existing debt in force of \$2,500,000,000 on the farms and homes of the United States occupied by owners and incumbered. Only some rough results of this inquiry are now known. It is probable that the number of families occupying and owning mortgaged farms and homes does not exceed 2,250,000, leaving perhaps 10,250,000 families that hire their farms and homes or occupy and own them free of incumbrance. The total number of families occupying farms is supposed to be about 4,750,000, so that about 7,750,000 families occupy homes.

STATISTICS OF PRODUCTION.

The exhaustive investigation made in connection with the Tenth Census as to the production of meat, cotton, tobacco, and the cereals, and likewise into forestry, renders it unnecessary that the present inquiry should be extended beyond the developments and other changes of the past ten years, and the principal features of the forthcoming agricultural report will accordingly consist of subjects that have never before had any prominent place in census investigation. Among these are horticulture, viticulture, irrigation, the production of sugar, and the peculiar conditions of farm occupancy, which prevail in the southern states, all of which carry with them their own justification, horticulture being a subject of more or less importance in almost every state in the Union; viticulture, an interest that is rapidly coming into the front rank, especially in California and New York; the production of sugar, an industry that is now attracting a more than ordinary amount of attention; the cultivation of the soil by the freedmen of the south, a matter involving social

and economic questions of far-reaching importance; and irrigation, the agency to which some of the most prosperous agricultural regions of the United States owe their present productiveness, and the only method as yet by which a large portion of the arid belt can ever be successfully brought under cultivation.

Probably the most important investigation that is entirely new is that of irrigation in the arid states and territories, the results of which are being presented in a series of bulletins that will aggregate not less than three hundred pages, and be combined in a special report with suitable maps and illustrations. The intricate question of farm occupancy in the south, the outcome of the former condition of slavery, is being carefully investigated, and an endeavor is being made to trace the almost invisible line which divides the farm laborer from the tenant farmer. While various minor products of the soil have been taken account of for the first time in each of the great divisions into which agriculture naturally falls, it is in horticulture that the work of the division is mainly broadened.

On the farm schedule of the census of 1880 there were but twelve inquiries in the line of pomology. In preparing the agriculture schedule for the Eleventh Census, the questions relating to pomology were increased to fifty. The vineyard questions were increased to seven, but, in view of a special investigation, nurseries remained at two. The success of this work may best be judged by the several interesting bulletins on viticulture, floriculture, nurseries, and seed and truck farms, already published. It is a remarkable fact that the value of the product of these five industries amounted to \$226,508,718 in 1890, equivalent to the value of the product of three of the largest industries pertaining to the mineral industries in the United States, viz., coal, iron ore, and gold mining, the combined value of these products being \$226,465,045. These inquiries have certainly cleared the way for similar work, and our horticulturists are not likely to accept, in the future, anything less than has been accomplished by the

Eleventh Census. Without undertaking such an elaborate report on meat production as ten years ago, we have secured a correct enumeration of the range cattle, and the usual returns of live stock on farms. In accordance with the act of 1889 an attempt was made to secure statistics of live stock other than those on farms, that is, in cities, etc., but has not been very successful, though a report is in course of preparation on that subject.

MANUFACTURES.

In no branch of the census work was the plan laid with greater care than in the division relating to manufactures. More than a year before the enumeration, Mr. Frank R. Williams, who compiled the statistics of manufactures for the Tenth Census, and has charge of this work for the Eleventh Census, visited all the principal centres of industrial energy of the country, conferred with manufacturers, with the officers of trade associations, with economists, statisticians, and men of affairs. The schedules for every industry were prepared with the utmost caution, and new questions added only after mature consideration. The items of credit capital and borrowed capital, heretofore omitted, were asked for, and the returns are entirely satisfactory in nearly all lines of industry. We have been able to make separations between the so-called "productive" and "non-productive" forces, respectively, in order to ascertain the true proportion of labor and wages employed in actual production; and a classified wage table has been added, to show the number of persons employed at the various rates of wages paid. Additional inquiries have been incorporated to show, as nearly as possible, the actual cost of production. Success has attended all these improvements. The large increase in number employed, value of product, and capital invested, in the rough additions thus far made, leave little doubt of the thoroughness of the work. I regard the withdrawal of the schedule relating to manufactures from the regular enumerator as the emancipation of

American industrial statistics. I am sure General Walker will be glad to learn that I took three times as many cities and towns out of the hands of the enumerators as he did in 1880, and the result has been most satisfactory. It might be well to state in this connection that, by the provisions of the census law, the Superintendent of Census has authority, whenever he may deem it expedient, to withdraw the manufacturing schedules from the enumerators and charge the collection of the requisite data upon experts and special agents to be appointed without regard to locality. Under the authority thus conferred the collection of the statistics of manufactures in 1040 cities and towns, without regard to population, was withdrawn from the general enumeration, and the duty assigned to special agents appointed immediately after the completion of the count of the people.

In all localities where the statistics were not withdrawn, as above noted, the returns have been collected by enumerators. In the case of the following industries special reports will be made by expert special agents charged with this duty, as noted in each case:—

Chemical industry; clay and pottery products; coke and glass; cotton goods; distilled spirits used in the arts, manufactures, and medicine; electrical apparatus and appliances; their manufactures and uses; manufactured gas; iron and steel; mixed textiles; printing, publishing, and the periodical press; salt; ship-building; silk and silk goods; wool and worsted.

Special schedules have been prepared for each of the following industries, covering the general and technical details relating to each, which manufacturers engaged therein regarded as best adapted to elicit accurate information as to the existing conditions:—

- No. 1. Agricultural implements.
- “ 2. Paper mills.
- “ 3. Boots and shoes.
- “ 4. Leather, tanned and curried, including morocco leather.
- “ 5. Lumber mills and saw mills.
- “ 6. Brick yards.
- “ 7. Flour and grist mills.

- No. 8. Cheese, butter, and condensed milk factories.
- " 9. Slaughtering and meat packing.
- " 10. Chemical manufactures.
- " 11. Clay and pottery products.
- " 12. Coke.
- " 13. Cotton manufactures.
- " 14. Dyeing and finishing of textiles.
- " 15. Electrical industry.
- " 16. Glass.
- " 17. Manufactured gas.
- " 18. Iron and steel.
- " 19. Printing, publishing, and the periodical press.
- " 20. Ship-building.
- " 21. Silk and silk goods.
- " 22. Wool manufactures.
- " 23. Hosiery and knit goods.
- " 24. Carriages and wagons.
- " 25. Salt works.
- " 26. Leather, patent and enamelled.

Supplemental. Distilled spirits used in the arts, manufactures, and medicine.

In the case of all industries for which special schedules have not been provided, as above set forth, a general schedule of questions has been prepared, with a view to collecting data which will clearly show the general characteristics of each branch of manufactures to be reported on the general schedule.

A number of bulletins has been issued from this division, and I especially call attention to the one relating to the lumber interests of the three northwestern lumber states, as a sample of excellent statistical work.*

MINERAL STATISTICS.

Before the year closes a quarto volume of about twelve hundred pages, with illustrations and maps, will be issued from the government printing office, and it will speak more eloquently than I can for the branch of the work relating to the mineral resources of the United States. This report has been prepared under the direction of Dr. David T. Day, and consists of papers from the following well-known experts:—

* Extra Bulletin No. 5.

Subject.	Author.	Number of Pages.
Manganese, petroleum, and natural gas.....	Joseph D. Weeks	164
Gold and silver.....	Richard P. Rothwell.. ..	124
Coal	John H. Jones	80
Stone	William C. Day.....	68
Quicksilver	James B. Randol.....	66
Antimony, asphaltum, ozocerite, gypsum, infusorial earth, corundum, millstones, whetstones, asbestos, graphite, soapstone, bar- ytes, ochre, fluorspar, litho- graphic stone, sulphur, pyrites. }	E. W. Parker.....	60
Iron ores.....	John Birkinbine	28
Copper, lead, and zinc	Charles Kirchhoff.....	20
Precious stones.....	George F. Kunz	10
Phosphate rock	Edward Willis.....	10
Aluminum.....	R. L. Packard.....	8
Mineral waters	Albert C. Peale.....	8
Mica.....	L. J. Childs.....	4
Marl.....	Jefferson Middleton.....	2
Tin, nickel and cobalt, chromic iron ore, platinum, and iridium. }	.....	18

From a statistical point of view, we have undoubtedly made a decided step in advance in this branch of census work. The increase during the decennium of the number of persons employed, quantity of product, and value of product, indicate that the work has been thoroughly done. The favorable reception of the bulletins by the scientific journals of this country and Europe has been alike gratifying to the experts in direct charge of the work and to the Census Office.

FISHERIES.

In the inquiry relating to fish and fisheries, we started with what is known as "a comprehensive plan," which nearly resulted in disaster. It was intended that the inquiries should be more numerous and far-reaching than had been used in any previous census. After a time, however, some changes were made, and the division put on a more practical basis. The present plan and the one that will be carried

out, in fact, is being carried out, is the preparation and publication of fifteen reports as follows:—

1. Marine mammalia.
2. Fisheries of the Pacific coast.
3. Fisheries of the Great Lakes.
4. The Gulf fisheries.
5. The New England fisheries.
6. The South Atlantic fisheries.
7. The fisheries of the Middle states.
8. Carp culture in the North Atlantic states.
9. Carp culture in the South Atlantic states.
10. Carp culture in the South Central states.
11. Vessels engaged in the fisheries.
12. Carp culture in the Western states.
13. Carp culture in the North Central states.
14. Bulletin relating to the edible qualities of carp.
15. The inland fisheries of the United States.

Some of these reports are published and others are now in type. The Fish Commission is giving the Census Office its hearty co-operation, and while the inquiry may have lost some of its original comprehensiveness and scope, it will have gained in statistical completeness and economic value.

TRANSPORTATION.

Railroads, lake, ocean, river and canal transportation, express business, and street railroads comprised one division of the work of the Census Office, and under the direction of Prof. Henry C. Adams, of Ann Arbor, we may expect most valuable results. Part of this work is now ready for the final volume, and all of it will be ready for the printer this year. We shall have complete railroad statistics for the ten years ended 1889, termed the decennial work, and we shall have likewise the complete work for the year ended June 30, 1890. For the first time we have gone into the question of street railways, with some marvellously interesting and valuable results. The same is true of the express business.

The attempt to secure statistics of transportation by water has been made for the first time by the Eleventh Census, so

that the work must be considered largely experimental. That there existed an exceedingly large amount of information relative to transportation by water I am well aware, but when it came to securing and formulating that information we are met with those difficulties which always attach themselves to experimental work. What was sought for was the necessary figures and facts of equipment, tonnage, value, and ownership; the returns of trips made during the census year; the freight carried both in bulk and in detail of commodity; where that freight was carried to and the number of miles covered in such transportation; the expenses and profits of the work of transportation, and a particular account of the officers and crew employed, with the wages paid and length of employment. In fact, everything was sought for that would enable the Census Office to furnish a complete presentation of all that was worth knowing concerning the industry of transportation by water as conducted by American craft. These statistics, it should be understood, not only refer to the vessels engaged in the freight and passenger traffic, but cover every class of floating construction, from the push-boat on the Little Kanawa to an Atlantic liner, and from a barge on the Dismal Swamp canal to a steamer trading with the Orient.

In order to secure this information complete lists were made of every class of vessels; over 40,000 schedules of inquiry were sent out by an organized force of clerks to the various vessel owners; incorrect or insufficient returns were remedied wherever possible by correspondence; and wherever these means were found insufficient special agents were dispatched to work in the field.

The work of gathering the information was closed in July last, and since that time experts have been employed in segregating and compiling the vast amount of unclassified information. Some idea of the progress of the work may be gathered from the bulletins already published on the subject.

INSURANCE.

As in the transportation statistics, we have given the statistics of the fire, marine, and inland insurance companies for ten years. This work is all completed. Of the old line life insurance companies the statistics have been gathered and the data prepared for the census year, and the results are in process of tabulation. The statistics of the assessment and co-operative insurance companies (fire and life), the fraternal and independent beneficiary organizations, miscellaneous insurance companies, and the fire department and water supply of the United States have also been gathered. This work has been in charge of the expert who prepared the data ten years ago, and will be completed during the coming year.

THE INDIANS AND ALASKA.

The work of taking the census of Alaska and of the Indians has been prosecuted successfully. The final report on the Indians is now ready for the printer, and the report on Alaska will be finished in December, all the material having been collected. The census of the Indians embraced two propositions: first, enumeration; the second, a report on their condition. A bulletin, No. 25, was issued as early as January 29, 1891, giving the approximate census. For the enumeration of fifty-three reservations the United States Indian agents were appointed enumerators. A corps of special agents was also appointed, who visited each reservation and saw that the census was properly taken or had been, and made a report on the condition of the Indians of each reservation.

The five civilized tribes were enumerated by Indian and white enumerators under the charge of a special agent for each of the tribes, who also reported on their condition. A very large white and colored population was found in the five tribes, equal to that of several of the smaller states of the Union.

The Six Nations of New York were enumerated and reported by a special agent. This work required almost eleven months. The Cherokees of North Carolina were also enu-

merated by a special agent. The Moqui Pueblos and Pueblos were also specially reported on. A series of illustrations was made with brush and pencil, and also by the aid of the camera, which will give an exhaustive idea of the actual condition of the Indians in 1890. Seven artists of standing were appointed special agents, who contributed much toward making this census a success. The Indians taxed, or those living off a reservation, or out of tribal relations, were also enumerated by the regular enumerators. The enumeration of the Indians included some thirty states and territories, and beside employing some hundreds of the regular enumerators demanded ninety-four Indian agent enumerators and special agents in the service. The work was a serious problem, but, under the able direction of Thomas Donaldson, Esq., has been satisfactorily completed to the point of publication. Four extra bulletins are now under way.

The list of names of all tribal Indians (excepting those of two tribes) is for the first time in any census in the Census Office, and in many cases both the Indian and the white names are given. The scope of the work was large but practical, and the result has been satisfactory thus far. It embraces age, wealth, resources, and all items of an economical nature. The schedules for Indian enumeration were quite different from those used in the other census work, being more simple.

Besides a complete enumeration of the Alaskan population, Mr. Petroff, who again undertook the Alaskan work, will give an exhaustive review of Alaskan commerce, and I have obtained a number of excellent monographs, written by intelligent residents of Alaska, descriptive of their sections of the territory. The statistics of fisheries and of mining have also been collected. The entire report will be both reliable and interesting.

PERMANENT CENSUS BUREAU.

Having rapidly passed over the main features of the administration and organization of the Census Office, and having

pointed out wherein the Eleventh differs from previous censuses, I will close with a brief summary of these differences, and a plea for a permanent Census Bureau. The Eleventh Census will be more statistical and deal less with our latent resources and the technology of our industries than the Tenth did. It includes in its scope several new features, such as the investigation into private and corporate indebtedness, the special inquiry relating to the soldiers of the late war, and the widows of veterans. Several new questions were added to the population schedule, which, as I have shown, will throw light upon important questions. A report has been made upon the condition of the Indians, and valuable reports on the statistics of education, churches, and the fisheries are nearly completed. To this extent we have undoubtedly taken a decided step ahead of other censuses. The population work has been strengthened. I have no reason to doubt that the enumeration of the people was fully equal to the enumeration of the Tenth Census, and that enumeration could not be excelled under the present system. The tabulation, as I have shown at length, has been improved, and the classification greatly extended. Facts were collected in 1870 and 1880, but never tabulated, but their counterpart to date will find their way into the current volumes. As five-sixths of all the experts and chiefs had experience in the Tenth Census the office has benefited by their experience. In the special work healthy statistical advancement has been made all along the line. We did not attempt the impossible. We reduced the number of questions whenever practicable. We confined ourselves strictly to the salient points. We did not try to be too original. We were not too proud to take up the plans where our predecessors of the Tenth Census laid them down. We did not enlarge the scope but often condensed it. In this way we strengthened our vital statistics by the five-year registration work; we made it possible to secure correct schedules of the special classes by institution enumerators; we brought the electrical tabulation, as Mr. Wines has shown us, to bear on

the statistics of crime, pauperism, and benevolence; we discarded all but the essential questions in the educational schedules; we reduced the work relating to religious bodies to a point where the ministers and ecclesiastical officers would answer the questions; we strengthened the wealth, debt, and taxation work at every point; we added several new and important inquiries to the agricultural and horticultural statistics, and included subjects omitted by all previous censuses; we trebled the number of places in which the manufacturing statistics were withdrawn from the enumerators, and placed the collection in the hands of competent special agents, paid by the day, and brought every expert under the control of a central head at Washington, so there should be no overlapping; we applied the same method to the statistics of the mineral resources; we made the inquiry relating to fish and fisheries more statistical; we added several new and important features to the statistics of transportation; we included the ten years' work and the fraternal and independent beneficiary assemblies in the insurance branch; we made a complete report of the condition of all the Indians, and we have for the first time, I believe, the names of all but two small tribes on file in the Census Office; and we have kept up the reputation of the Tenth Census on the report on the population and wealth of Alaska. And with all these inquiries the word failure cannot be applied to one investigation.

Having done all this, and feeling, as we do, proud of some of our achievements, I give you the honest judgment of my collaborators when I say that much more remains to be done; that many imperfections exist. These imperfections are not the result of dishonest work, of incompetent work, of slovenly work; they are the result of the system under which the census is taken. Time enough is not allowed to start the machinery of this tremendous inquiry, embracing, as I have shown you, so many subjects and such infinite detail. We have work here which, if properly done, would be sufficient

to make a life study for thirty or fifty of our brightest specialists, literally dumped upon the shoulders of a man drawn from other occupations of life, and instructed by act of Congress to raise an army of sixty thousand raw recruits and complete the task. If he takes time to do it the public becomes impatient and declares it drags everlastingly. If he puts it through rapidly, croakers rise up all over the land and declare the work cannot be correct. The remedy for all this is a permanent Census Bureau, and already the intelligent public sentiment of all political parties is crystallizing in this direction. People are beginning to realize that the faults and errors of this census are not the short-comings of any one man but of a system.

In accordance with a resolution of the Senate I am preparing a report and bill for a permanent Census Bureau, which, if enacted, will remedy much of the decennial census trouble, and put a great public work on a business basis. Such a bureau would not only be an immense saving to the government, especially since the introduction of mechanical tabulation, but it would keep active and competent minds continually working out improvements in census methods; it would keep together a nucleus of trained census clerks and capable mathematicians; it would admit of certain branches of work being done annually at a cost of a few million circulars and a small amount expended for tabulation; it would give sufficient time to perfect the work of enumeration, and it would give general satisfaction to all who are earnestly in search of correct statistics of our nation's population and wealth. As statisticians, I hope you will help this idea along. It is growing with our statesmen. It is not a party question, and its success will be beneficial to all the people.

APPENDIX.

LIST OF BULLETINS ISSUED BY THE CENSUS OFFICE.

AGRICULTURE:	NUMBER.
Viticulture,	38
Truck Farming,	41
Commercial Floriculture,	59
Nurseries,	109
Seed Farms,	111
Production of Hops,	143
Horses, Mules, and Asses on Farms,	103
Live Stock on Ranges,	117
Irrigation in Arizona,	35
Irrigation in New Mexico,	60
Irrigation in Utah,	85
Irrigation in Wyoming,	107
Statistics of Tobacco Production. (Ex. Cen.)	13
ALASKA:	
Letter of Ivan Petroff on Census of	15
Population of	30
Wealth and Resources of	39
Official Count of	150
CHURCHES:	
United Presbyterian of North America, Church of the New Jerusalem (Swedenborgian), Catholic Apostolic, Salvation Army, Advent Christian, Evangelical Adventists, Life and Advent Union (Adventists), Seventh-day Baptists, Seventh- day Baptists (German), General Six Principle Baptists, Christian Church South, Schwenkfeldians, Theosophical Society, and Brethren in Christ (River Brethren).	18
Cumberland Presbyterian, Church of Jesus Christ of Latter- day Saints (Mormons), Reformed Episcopal, Unitas Fratrum or Moravian, German Evangelical Synod of North America, German Evangelical Protestant of North America, and Ply- mouth Brethren.	70

- Roman Catholic, Greek Catholic (Uniates), Russian Orthodox, 101
 Greek Orthodox, Armenian, Old Catholic, and Reformed Catholic.
- Mennonite, Bruederhoef Mennonite, Amish Mennonite, Old 131
 Amish Mennonite, Apostolic Mennonite, Reformed Mennonite, General Conference Mennonites, Church of God in Christ, Old (Wisler) Mennonites, Bundes Conference der Mennoniten Brueder-Gemeinde, Defenceless Mennonites, Mennonite Brethren in Christ, Brethren or Dunkards (Conservative), Brethren or Dunkards (Progressive), African Methodist Episcopal, Wesleyan Methodist Connection, African Union Methodist Protestant, Independent Churches of Christ in Christian Union. Temple Society, Church of God, Reorganized Church of Jesus Christ of Latter-day Saints, Society of Shakers, Amana Society, Bruederhoef Mennonite Society, Harmony Society, Society of Separatists, New Icaria Society, and Society of Altruists.

EDUCATION :

- Preliminary Statistics for Louisiana, New Hampshire, Wisconsin, and cities of 10,000 inhabitants and over ; also, Mormon schools in Arizona, Idaho, and Utah. 17
- Statistics for Arizona, California, Connecticut, District of Columbia, Maine, Maryland, Massachusetts, Montana, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Vermont, Virginia, Wyoming, and eighty-three cities. 36
- Statistics for Alaska, Arkansas, Delaware, Illinois, Iowa, Michigan, Minnesota, Mississippi, New Mexico, New York, North Dakota, Oregon, Texas, Utah, Washington, West Virginia, and forty-two cities. 53
- Statistics for Alabama, Colorado, Florida, Georgia, Idaho, Indiana, Kansas, Kentucky, Missouri, Nebraska, Nevada, New Jersey, Tennessee, and one hundred and five cities. 84
- Summary of Statistics of. (Ex. Cen.) 11

FARMS, HOMES, AND MORTGAGES :

- Letter to Secretary of the Interior on 5
- Statistics of Alabama and Iowa. (Ex. Cen.) 3
- Statistics of Kansas. (Ex. Cen.) 14
- Statistics of Tennessee. (Ex. Cen.) 15

FISHERIES :

List of Products of,	2
Marine Mammalia,	123

GEOGRAPHICAL :

Supervisors' Districts,	1
Names and Addresses of Supervisors,	4
Areas of States and Counties,	23
Centre of Population,	34
Population by Drainage Basins,	47
Population with Reference to Mean Annual Temperature,	33
Population in Accordance with Mean Annual Rainfall,	32
Population in Accordance with Mean Relative Humidity,	44
Population in Accordance with Latitude and Longitude,	63
Population in Accordance with Topographical Features,	65
Population in Accordance with Altitude,	89
Increase and Decrease of Population, 1880-90. (Ex. Cen.)	1
Distribution of Population According to Density, 1890. (Ex. Cen.)	2

INDIANS :

In the United States (except Alaska) Taxed or Taxable and Untaxed.	25
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INSURANCE :

Business transacted in Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Dakota (North and South), Delaware, District of Columbia, and Florida. (Ex. Cen.)	6
Business transacted in Georgia, Idaho, Illinois, Indiana, Indian Territory, Iowa, Kansas, Kentucky, Louisiana, and Maine. (Ex. Cen.)	7
Business transacted in Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, and New Hampshire. (Ex. Cen.)	8
Business transacted in New Jersey, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, and Tennessee. (Ex. Cen.)	9
Business transacted in Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming. (Ex. Cen.)	16

MANUFACTURES:

Cities and Towns in which Statistics will be collected by Special Agents.	3
Production of Pig Iron,	9
Production of Steel,	13
Distilled Spirits used in the Arts, Manufactures, and Medicine,	22
Lumber Mills and Saw Mills and Timber Products. (Ex. Cen.)	5

MINES AND MINING:

Quicksilver Mines and Reduction Works,	10
Precious Stones and Diamond Cutting,	49
Production of Slate,	8
Production of Granite in the United States,	45
Production of Mica,	61
Production of Manganese Ores,	68
Production of Bluestone,	71
Production of Sandstone,	73
Production of Petroleum,	76
Production of Limestone,	78
Production of Aluminum,	79
Production of Lead and Zinc,	80
Production of Copper,	96
Production of Iron Ore,	113
Minor Mineral Industries,	75
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CRIMINAL STATISTICS.

REPORT ON THE ANNUAL STATISTICS OF PRISONERS, COLLECTED
BY WARDENS' ASSOCIATION.BY ROLAND P. FALKNER,

A year ago it was my privilege to speak at length before this organization on the subject of criminal statistics. The suggestions embodied in my remarks were then adopted by this body, and today it is my agreeable duty to report briefly upon the progress of the work. The plan of the work was very simple. A card containing spaces for the desired information was printed, one card to be filled out for each prisoner received during the year, designated by number. The cards were sent in sufficient quantity to the institutions taking part in the work, and after being filled out by them were returned to the secretary, who undertook the compilation of the results. The burden on the individual institutions was a very slight one, and it is no doubt owing to this fact that such a liberal and generous response was given to the request of the secretary for participation in the work. Thirty-nine institutions courteously undertook the work and furnished us with returns for a total of 10,000 prisoners.* On the receipt of these 10,000 or more cards they were carefully separated and counted for each institution returning. The results are thus to be had in detail for each institution, and though they cannot be printed in this form are at the disposal of anyone applying for copies. After this work was completed the various result slips for each institution were taken and added together to obtain a total. This work only needs a final revision before it can be laid before you in printed form.

Before giving an outline of the results of the investigation allow me to speak for an instant on the methods employed. The results proved the wisdom of the card selected. Nearly all the points requested were fully answered, and this gives a much-to-be-desired uniformity to the results. In one case the inquiry was quite unsatisfactory, *i. e.*, as to the length of time at school. Few answers were received, and the returns are so incomplete as to make tabulation difficult, if not impossible. This question was confessedly an experi-

* The list is printed at the close of this paper.

ment, and as such undoubtedly it failed. None, I think, will for a moment refuse their assent to the motive which prompted the question,—the desire to obtain an idea of the mental acquirements of the prisoners able to read and write. This is of prime importance, but it is admittedly difficult to find a statistical measure.

Again, the returns in regard to parentage were not all that could be desired. This results not so much from the inherent difficulty of the case as from the fact that in many cases the prison records are silent on this point. The figures for 1890 were made up largely from the records and not from direct questioning. When the work is organized on a permanent basis it is evident that this defect will be avoided, as questions may be asked of the prisoner at the time the record is made.

Apart from the two cases just mentioned, no fault can be found with the manner in which the questions were answered. The material thus placed at our disposal was wonderfully uniform, and as far as it went equal to anything that official statistics could require.

Coming now to a consideration of the results of the investigation, the effort has been made to arrange the material in such a way as to obtain the most numerous results possible. To this end two series of tables have been prepared.

The first series of tables gives the prominent facts of the inquiry, —sex, race, nativity, age, conjugal condition, occupation, education, crime, sentence, and previous convictions for the prisoners of each institution separately.

In brief outline let us review some of the results of these tables. In the 37 institutions of the United States we have a total of 9858 inmates, of whom 9632 are male and 227 female, or, roughly, only $2\frac{1}{4}$ per cent of the prisoners here noted are female. Here, of course, the institutions reporting exercise some influence on the result, but that our figures are fairly typical is shown by the fact that in 1880 women composed 2.78 per cent of prisoners serving sentences of one year or over. For it must be remembered that our figures are drawn almost exclusively from the penitentiaries, and less than 4 per cent of the prisoners included in our tables were sentenced for a shorter period than one year.

Texas, North Carolina, Maryland, and Kentucky are the only states south of Mason and Dixon's line that figure on our list, and yet 1932 out of 9859, or in the neighborhood of 20 per cent, are colored.

In 1880 there were about 12 per cent colored in the entire population. No doubt, if we compare our figures with the figures for the colored race in the states named in the table only the showing would be still more unfavorable.

Nearly 20 per cent of the convicts in our tables were foreign-born whites, and yet this element of the population, according to the census of 1880, was about the same as the colored (about 13 per cent). It is hoped to show here the most interesting qualifications. In the first place, we must bear in mind that the foreign-born population contains relatively few infants, and hence here we will compare only adult population. No doubt we shall discover sections of the country where this element furnishes more than its proportional contingent, and others again where the figures for the foreign born are more favorable than for the native Americans.

While we find with reference to age that nearly two-thirds of all the prisoners are less than 30 years of age, we shall undoubtedly find districts in the West where the average will be much higher. Thus, in Nevada, more than two-thirds exceed the age of 30 years. Carrying similar comparisons through for the different institutions, we shall undoubtedly find many interesting and instructive deviations from the average.

It is a familiar fact, and easily explained by a reference to the ages of the prisoners, that the unmarried are in the majority, in our tables 6779 out of 9859. Furthermore, it need not be stated that the mass of prisoners come from the ranks of unskilled labor, and that their mental acquirements are low. If proof were needed it can be seen from the facts as shown by our tables that 7106 belong to the class of personal and professional occupations, which includes common laborers, and further that only 7671 out of 9858 are able to read and write.

Among the crimes committed those against property of course predominate, forming 7457 out of 9858, or, roughly, 75 per cent. Here again interesting differences are observed between different localities. For these crimes varying sentences have been imposed, though the bulk of them are probably shorter than three years' duration. When our statistics further show that as many as 8249 of the prisoners have had no previous convictions, I think you will probably agree with me that the figures are incorrect.

After this summary of the results in a general way, let us turn to

the more minute study of the figures made in the second series of tables. This second series of tables sets forth the relations of the facts brought out in the first series of tables to the character of the crime committed. For this purpose a most extended combination of the facts has been carried out. Let me illustrate by an example. Take, for instance, the relation of age to crime.* We take up first the male prisoners and divide them into native white, foreign-born white, and colored. Under each of these three divisions we divide off the four classes of crimes,—against the government, against society, against the person, and against property. Under each of these heads we show the number of crimes committed by persons in each age-class. Or, to put it in another form, we can, if we wish, find from this table the number of crimes against the person committed by native white males in the ages 20–24. The illustration shows the extent of the subdivision. The same subdivision is applied to the female prisoners, and from the two groups the total is found. The series of combinations here illustrated by the example of age is carried out for the further facts of conjugal condition, occupation, education, sentence, and previous convictions.

I do not wish to trespass upon your time further than may seem necessary to give a correct notion of the scope of our work. Instead, therefore, of summarizing the results of this inquiry, permit me to analyze a single table. Let us consider for a moment the relation of race and nativity to crime. We divide the prisoners into the three classes, native whites, foreign-born whites, and colored. In the order named these classes furnish 61, 19, and 20 per cent of all the prisoners in the table. This division is, however, altered in the various classes of crime. Thus, in crimes against the government, in general military offences, and offences against the postal service, the contingent of the native whites rises to 70 per cent, while that of the colored falls to 8 per cent, the foreign-born whites showing 22 per cent. In crimes against society, on the other hand, the native whites fall slightly below the average, each of the other classes rising slightly above it. Again, in crimes against the person the proportion of native whites sinks to 52 per cent, foreign whites show 22½ per cent as against 19 per cent in the grand total, and colored 25½ per cent as against 20 per cent, showing clearly the greater tendency of these

* A specimen table, Education and Crime, is printed at the close of this paper.

elements to this class of crime. In crimes against property the native-born convicts form 64 per cent, or 3 per cent more than in the entire number. This is met by a slight falling off of the contingents of the other two elements.

If we examine the table more closely we shall gain some instructive light on the crime tendencies of the different nationalities. One or two may be picked out at random. Thus we see that of 14 Welshmen only 7 were convicted of crimes against property, whereas of 44 Scotchmen as many as 38 were convicted of similar crimes. A larger percentage of crimes against the person is committed by the Irish than by the Germans. Of 17 Hungarians reported 10 are convicted of offences against the person, and among 99 Italians 61 for the same class of crime. Here the usual order is reversed. Other nations show a larger percentage of crimes against property than the average.

When it is considered that an equally searching analysis is to be made of the relations of all the other facts collected to these classes of crimes, it will, I think, be seen how great the value of this work will be. It deserves, I think, a wider recognition and co-operation than it has received.

It is not claimed that these tables, which we hope to present to you within a month, will give any notion of the *quantity* of crime. They could do this only if they included all institutions of the same class in the United States, and this they do not do at present. The larger the co-operation in the work the nearer our figures approach the actual quantity of crime committed. It does not seem too much to hope that the day will come when all the penal institutions will join in the work. When they do we shall be able to follow the course of crime from year to year, and investigate the influences which affect the *amount* of crime.

Our present figures deal with the *quality* of crime. No pains have been spared to make the study of the personal characteristics of the prisoners committed in 1890 as complete as possible.

APPENDIX A.

LIST OF THE INSTITUTIONS FURNISHING STATISTICS.

- Arizona*, Territorial Prison, Yuma.
California, State Prison, Sacto County.
Colorado, State Penitentiary, Cañon City.
Illinois, State Penitentiary, Joliet.
 " Southern Illinois Penitentiary, Chester.
Indiana, Girls' Reformatory and Women's Penitentiary, Indianapolis.
Iowa, State Penitentiary, Fort Madison.
 " State Penitentiary, Anamosa.
Kansas, State Penitentiary, Lansing.
 " United States Military Prison, Fort Leavenworth.
Kentucky, Penitentiary, Frankfort.
Maine, State Prison, Thomaston.
Maryland, Penitentiary, Baltimore.
Massachusetts, House of Correction, South Boston.
Michigan, State Prison, Jackson.
 " State House of Correction, Ionia.
Minnesota, State Reformatory, St. Cloud.
Nebraska, State Prison, Lancaster.
Nevada, State Prison, Carson City.
New York, State Prison, Sing Sing.
 " State Reformatory, Elmira,
North Carolina, State Prison, Raleigh.
North Dakota, Penitentiary, Bismarck.
Oregon, State Prison, Salem.
Pennsylvania, Eastern State Penitentiary, Philadelphia.
 " Western State Penitentiary, Allegheny.
 " Industrial Reformatory, Huntingdon.
 " Chester County Prison, West Chester.
 " Schuylkill County Prison, Pottsville.
Rhode Island, State Prison, Howard.
South Dakota, Penitentiary, Sioux Falls.
Texas, State Penitentiary, Huntsville.
 " State Penitentiary, Rusk.
 " House of Correction and Reformatory, Gatesville.
Vermont, State Prison, Windsor.
Washington, State Prison, Walla Walla.
Wisconsin, State Prison, Waupun.

CANADA.

- Ontario*, Penitentiary, Kingston.
 " Central Prison, Toronto.

APPENDIX B.
Specimen of Tabulation in Second Series Education and Crime.

	NATIVE WHITE.				FOREIGN-BORN WHITE.				COLORED.				TOTAL.			
	CRIMES AGAINST.				CRIMES AGAINST.				CRIMES AGAINST.				CRIMES AGAINST.			
	Gov- ern- ment.	Soci- ety.	Per- son.	Prop- erty.	Gov- ern- ment.	Soci- ety.	Per- son.	Prop- erty.	Gov- ern- ment.	Soci- ety.	Per- son.	Prop- erty.	Gov- ern- ment.	Soci- ety.	Per- son.	Prop- erty.
MALES.																
Neither read nor write....	15	27	126	428	506	6	14	107	179	306	12	43	206	701	962	1,864
Read but not write.....	....	7	30	79	116	1	3	3	....	2	21	72	86	12	54	240
Write but not read.....	....	1	....	1	2	....	....	7	....	....	....	....	....	12	....	8
Both read and write.....	215	192	671	4,180	5,258	66	66	267	1,066	1,474	12	37	172	565	786	5,831
Total.....	230	227	827	4,688	5,972	73	82	367	1,294	1,816	24	82	399	1,338	1,843	9,631
FEMALES.																
Neither read nor write....	1	4	2	8	15	....	2	....	5	7	....	5	7	31	43	65
Read but not write.....	....	....	1	1	2	....	....	....	2	3	....	1	1	3	5	9
Write but not read.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Both read and write.....	4	23	15	44	86	....	3	9	14	26	1	2	10	28	41	133
Total.....	5	27	18	53	103	....	5	9	21	35	1	8	18	62	89	227
ALL PRISONERS.																
Neither read nor write....	16	31	128	438	611	6	16	107	184	313	12	48	213	782	1,005	1,929
Read but not write.....	....	7	31	80	118	1	3	3	24	31	....	3	22	75	100	249
Write but not read.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	8
Both read and write.....	219	215	686	4,224	5,344	66	66	266	1,100	1,500	13	39	182	583	827	5,917
Total.....	235	284	845	4,741	6,075	73	87	376	1,315	1,851	25	90	417	1,400	1,932	9,868

REVIEWS AND NOTICES.

SUICIDE IN THE EUROPEAN ARMIES.

The suicide of General Boulanger has furnished the French people with a fertile theme for conversation; and from contemplating the case of an individual many serious persons will turn to the consideration of the great number of suicides which are so frightfully frequent in the ranks, and more especially among the officers of the armies of all the great European powers.

The percentage of self-inflicted deaths has become so great in the French army that the Minister of War sent Dr. Longuet, one of the most distinguished military surgeons, as a delegate to the International Congress of Hygiene and Demography, to communicate to that assembly the results of his interesting statistical study of suicide in the European armies, of which investigation the following appear to be the principal conclusions.

FREQUENCY OF SUICIDE IN THE EUROPEAN ARMIES.

The Austrian army leads with a yearly average of 122 suicides for every 100,000 effective troops, from 1875 to 1887. The maximum was observed in 1889 with 149 per 100,000; the minimum in 1878 with 97. It will be necessary to add to this proportion of 122 per 100,000 in order to make it complete an average of 40 per 100,000 of abortive attempts of suicide. In this army suicide is sensibly increasing. From 1870 to 1874 the rate was 89 per 100,000; from 1875 to 1880, 112; from 1881 to 1887, 131.

Death by suicide represents a fifth part of the whole mortality of the Austrian army. There is no disease that is more deadly; typhoid fever, pneumonia, and, in some years, tuberculosis, cause fewer deaths.

Following the Austrian army is the German, with 67 per 100,000 from 1878 to 1888; 61 from 1873 to 1878; 57 from 1867 to 1875. That here also suicide is on the increase is shown by earlier statistics, which attribute to the Prussian army 50 per 100,000 from 1829 to 1839; and to the Saxon army, 64 from 1847 to 1858. Besides this number there are in the German army 10 attempts at suicide per 100,000.

In the Italian army, from 1874 to 1889, there were 40 suicides per 100,000 troops. Contrary to the suicide mortality of most of the

other armies, which has rapidly advanced, that of Italy is almost stationary.

In the French army (interior) there were 29 suicides per 100,000 from 1872 to 1889; and from 1862 to 1869, 47. This diminution, which corresponds to new conditions of recruiting, is considerable. In Algeria the French army has twice the proportion of suicides as in the interior, 63 per 100,000 from 1872 to 1889.

In the Belgian army there were 24 suicides per 100,000 from 1875 to 1888.

In the English army there were in the home service from 1882 to 1888, 23 per 100,000. In India, however, the division of Bengal presented during the same period a double suicide mortality, 48 per 100,000.

In the Russian army there were 20 suicides per 100,000 from 1873 to 1889 (including 1876-78), with a maximum of 31 in 1882, and a minimum in 1887 of 15.7.

In the Spanish army, in 1886, there were but 14 suicides per 100,000 effective troops.

CONDITIONS OF SERVICE: AGE, GRADE, DIVISION.

In the old armies, especially those recruited by enrollment, it was the older soldiers who generally committed suicide. This is still actually the case in the English army. In France, Italy, Germany, and Austria, on the other hand, it is today the young rather than the old soldiers who commit suicide. In Austria there is, so to speak, an excessive proportion of suicides of young soldiers, who kill themselves during the first month of their service.

The under-officers present three times the proportion of suicides that is found among the troupes; while the officers, who are older men of higher rank, furnish twice the number.

It is among the engineers that the suicides are generally least frequent; among the cavalry and infantry the most. Condemned soldiers in the military prisons and penitentiary institutions rarely take their own life. On the contrary, there are frequent suicides in the corps prisons among those soldiers who are accused and are awaiting trial.

MANNER OF SUICIDE.

Shooting is much the most frequent. It counts for more than one-half, and in the Austrian army for three-quarters, of the whole num-

ber. This proportion is four times as large as that offered by the civil population. Hanging and drowning are the two other modes that are most frequent. It is worth while to note that in the English army there is a great frequency of suicide by cutting the throat, a mode of self-murder unknown, so to speak, in the French army, but which occurs to a slight extent in the German.

It is in the infantry that the use of fire-arms is most common. Among the mounted soldiers hanging is much more frequent, and is often accomplished by means of the horse-bridles. In the prisons hanging is the almost exclusive mode.

Those who shoot themselves most universally aim at their heads. The army in Algeria, however, forms an exception. With these soldiers it is almost always the body that is shot; usually the abdomen or the chest; sometimes the neck, the shoulder, an arm, or a leg. May this not be due to the fact that among the Arabs an idea of infamy attaches to the mutilation of the head?

The seasons exercise their influence upon the manner of suicide; and in summer drowning is much more frequent.

CAUSES OF SUICIDE.

In the Austrian army a third of the suicides are attributed to a distaste for military duty. This cause shows itself with much less frequency in the other armies. The fear of punishment is said to cause one in three in Austria and Germany, one in five in France, and one in seven in Italy. Suicide caused by some love trouble is much more frequent in France, where one-fifth of the whole number is attributed to this cause, and in Italy, where it is responsible for one-seventh, than in England, Germany, and Austria. Mental disorders represent from one-fifth to one-twelfth of the whole number.

INFLUENCE OF THE SEASONS.

The increase of the frequency of suicide during the hot season is as marked in the army as among the civil population. The maximum suicidal mortality is reached during the hottest summer months, and the minimum during the coldest of the winter. Were we to graphically represent, by means of a tabulated map, the suicides that occur in the European armies, we should find them represented by a curve having all the regularity of that of any malady which depends upon the influence of the seasons.

FRED P. EMERY.

PARIS, October, 1891.

MOVEMENT OF POPULATION IN FRANCE FOR 1890.

The March number of the *Publications* contained a review of an article on the *Birth rate in Europe during the last 20 years*. The article upon which the review was based was written by Charles Richet, who showed that the birth rate has decreased for all countries in Europe, but that the rate of decrease is increasing more rapidly in France than in any other country. He also made the prophecy that it will not be long before the death rate will exceed the birth rate. This prophecy is fulfilled in the year 1890, as shown by an article in the *Revue Scientifique*, November 7, 1891, of which the following is a summary.

During the year 1890 there were 269,332 marriages, 3602 less than in 1889; 838,059 births, 42,520 less than the year before; and 876,505 deaths, 81,572 more than in 1889.

This evil, foreseen for many years, has then taken such rapid strides that the diminution of the population is already an accomplished fact. Considering the figures alone this is undeniably the case. The excess of births over deaths, which in 1889 amounted to about 85,000, and which has varied between 44,000 and 200,000 since 1872, has suddenly changed to an excess of deaths over births, and the population has diminished by some 30,000.

But the very suddenness of the change indicates in itself that some abnormal element exists in this phenomenon which is important to investigate. In 1854 and 1855 the French population lost about 100,000, but the loss was attributed to cholera and the Crimean war. Again, in 1870 and 1871, there was a new loss of 500,000, but the German invasion with its cortege of maladies was responsible. And now the decrease in 1890 is accounted for by the epidemic of *la grippe*, which began at the close of 1889 and lasted throughout a good portion of the year 1890.

It is estimated that *la grippe* caused directly or indirectly from 30,000 to 40,000 deaths, and to this must be added the number of births that were prevented because of the illness of a large portion of the population.

The number of births began to increase in August, the eighth month of the year. Now, the difference between the average monthly number of births since August and the average number up to August is 29,000. Besides, it is stated that the birth rate increases more and

more towards the end of the year, that is, as the effects of the epidemic become fainter and fainter, and, also, that the birth rate is tending towards its usual figure.

These observations authorize the addition of 30,000 births prevented to the 40,000 lives actually lost by the epidemic, which gives a total of 70,000 units loss due to *la grippe*. The population being decreased 40,000 units, this would give a theoretical increase of 30,000 units, which would be actual if the year had been normal. The increase would not be much to boast of, however, and inferior to the increments of preceding years.

Since writing the above there has been received an extract from the *Journal Officiel*, of Oct. 21, 1891, on *Le mouvement de la population en France pendant l'année, 1890*.

It is stated that the year 1890 was one of the most disastrous to the population. The number of births in 1890 exceeded the number born in 1871 (the poorest year) by only 12,000. The number of deaths in 1890 has not been exceeded by any year for 20 years, while the number of marriages has not been so low for 40 years. The whole situation is reported as being due to the epidemic. Of the 87 departments only 17 had an excess of births over deaths. These were principally in the north of France. In 60 departments there was an excess of deaths over births, chiefly in the basin of the Garonne.

The *Direction de l'assistance et de l'hygiène* has just published the sanitary statistics for France for the year 1890, and also for the quinquennial period 1886-90. The tables give the total deaths for all causes, and the principal causes of death in the cities and parishes of France and Algeria of 5000 inhabitants or over, taken from the monthly bulletins of the municipalities.

Some of the cities made incomplete returns and some none at all. From those that did the average annual mortality for the five years 1886-90 is 842,465, or 22.21 per 1000. The rate for Paris is but little above their general average, viz., 24.3. The high rates for Nanterre, Gentilly, and Ivry, 180.8, 56.1, 40.9 respectively, are due to the many hospitals at these places.

8 cities have a death rate of more than 40 per 1000.									
22	"	"	"	"	"	"	"	"	"
42	"	"	"	"	"	"	"	"	"
5	"	"	"	"	"	"	"	"	"
20	"	"	"	"	"	"	"	"	"

One city, Givet, has a death rate of only 10 per 1000.

The mortality in Algiers is high for all cities except Guehna and Batna, where the rate is only 14 per 1000. The rates for some of these cities are:—

Mestapha,	71.5	Saida,	42.7
Bougie,	51.5	Relizane,	41.8
Mostaganem,	43.9	Guehna and Batna,	14.0
Constantine,	43.3	All others at least	30.0

With the exception of Paris, where the low death rate is due, without doubt, to improved sanitation, the average death rates increase with the density of the population.

Death risks in cities below	5,000 inhabitants, 21.74
" " " " from 5,000 to 10,000 "	24.84
" " " " " 10,000 to 20,000 "	26.60
" " " " " 20,000 to 100,000 "	27.21
" " " " " 100,000 to 200,000 "	28.31

The principal causes of death are as follows:—

Phthisis	caused one death in every 7.4 deaths.
Pneumonia	10.9 "
Bronchitis	13.7 "
Diarrhoea	11.0 "
Diphtheria	37.5 "
Typhoid fever	44.5 "
Measles	47.8 "
Small pox	96.2 "
Whooping cough	143.0 "

Neither phthisis nor the diseases of the respiratory organs have decreased, while pneumonia and bronchitis have increased. This increase is attributed to *la grippe*, which was epidemic in all Europe and in most of the United States in December of 1889 and January of 1890, increasing the death rates at all places.

The average number of deaths in Paris for the years 1886–89 was 4414 for December and 4962 for January. For the years 1889 and 1890 these figures increased to 7437 and 7147, respectively, showing an increase of about 6000 deaths for these two months. The deaths from *la grippe* alone in the different cities were as follows:—

Montpeller,	21.4 per 1000 living.	Caen,	18.2 per 1000 living.
Levallois-Pellet,	19.7 " " "	Marseilles,	18.2 " " "
Reims,	19.0 " " "	Brest,	17.7 " " "
Rouen,	18.0 " " "		

Paris, with a death rate of 15.0 per 1000 is the twenty-eighth city on the list.

G. N. CALKINS.

STATISTICAL YEAR-BOOKS AND ANNUALS.

Die Bevolkerung der Erde. VIII. By H. Wagner and A. Supan. Justus Perthus. Gotha, 1891. Pp. x, 271.

This compilation of the population of the earth was begun in 1872 by Ernst Behm, and up to 1882 was made seven times. An eighth issue was in preparation in 1884, when Behm died. Wagner states that he has been delayed in continuing this work on account of the relative poverty of the libraries at Gottingen as compared with those at Gotha. Since the appearance of the last issue of Behm's original work, it is to be observed that Levasseur published, in the *Bulletin l'Institut International de Statistique*, Vols. I and II, a complete survey of the statistics of area and population of all the countries of the earth, and that Ravenstine of England has made an estimate in 1468 millions.

The population of the earth is now estimated at 1480 millions, divided as follows:—

Europe without the Atlantic islands,	857,379,000
Asia without the Polar islands,	825,954,000
Africa without Madagascar,	163,953,000
America without the Arctic region,	121,713,000
Australia including Tasmania,	3,230,000
The Oceanic islands,	7,420,000
The Arctic regions,	80,400

It is interesting to compare this total estimate with that of 1484 millions of 1882 and that of Levasseur's in 1886 of 1483 millions. In the statistics for the United States account is taken of the census of 1890, based upon the census bulletins of the different states. About 56 per cent of the whole population of the globe has now been enumerated by census or registration. The letter press is very full in describing changes that have taken place in all countries, so that one can gather minute details with regard to the progress of survey and censuses taken in the different nations of the world.

Statistical Abstract of the United States, 1890. Published by the Bureau of Statistics, Department of the Treasury. Washington, 1891. Pp. 346.

The Statistical Abstract of the United States is like its predecessors in scope and arrangement of matter. This issue is the thirteenth, and is made up of 219 tables as compared with 212 in 1889. The

additional tables relate for the most part to statistics of commercial failure, immigration, and prices. Naturally, the census returns of 1890 are made use of. It is unfortunate that this annual abstract cannot be printed more promptly, though it is to be observed that the desirability of this is fully recognized by the Treasury officials.

The Statistical Year-Book of Canada for 1890. Published by the Department of Agriculture. Compiled by Sydney C. D. Roper. Ottawa, 1891. Pp. 628.

The Canadian Year-Book has reached its sixth issue and now forms a substantial volume of statistical material well arranged and digested. There are fourteen chapters devoted to the subjects of government, population and vital statistics, finance, trade, post-office and telegraphs, agriculture, mineral statistics, mercantile marine and fisheries, railways and canals, social and other statistics, banks, public lands, militia, and insurance.

Additions have been made particularly in this issue in the chapters on trade and mineral statistics, and appendices give copies of all the proposed tariff changes of the present session. No use is made in this issue of the census returns of 1891.

Statistical Tables for British India. 15th issue. Compiled in the Statistical Branch of the Finance and Commerce Department. Calcutta, 1891. Pp. 176.

These tables relate to the census, emigration, native passenger ships, railways, forests, cotton, jute, woollen and paper mills, breweries, collieries, large industries, joint stock companies, salt revenue, customs revenue, foreign trade, foreign shipping, and vessels.

The census returns relate to 1881, and consequently there is nothing in the report upon this point which is new. The average annual emigration during the period 1880-90 was 13,180, an inappreciable proportion of the population. One in every two emigrants returns. Comparative tables show the progress in railways and manufactures.

Oesterreichisches Statistisches Handbuch. Ninth Year, 1890. Published by the K. K. Statistischen Central-Commission. Vienna, 1891. Pp. 282.

This covers the subjects usually embraced in statistical year-books. The comparative tables, as a rule, do not go back more than five years, and but few of the results of the last census are included. The new matter relates particularly to the subject of emigration.

Annuaire Statistique de la Belgique. 21st issue, 1890. Brussels, 1890. Pp. 357. Published by the Ministère de l'Intérieur.

This year-book is justly considered one of the fullest and most useful of government publications devoted to the presentation of statistical material in any language. Not only is the table of contents arranged in analytic form, but there is in addition a very detailed index, so that the inquirer can find the information desired with great ease. The work is divided into three main divisions: area and population; the political, intellectual, and moral condition; and agriculture, industry, and commerce. Each of these grand divisions is then subdivided into a great number of minor headings. Where there is such an abundance of statistical matter it is impossible to single out any special portions as particularly striking. For the statistician it is valuable as furnishing suggestions for inquiries new to this country, and for the student it furnishes a large amount of illustration.

Statistisk Årsbok för Finland. Issued by the Statistiska Centralbyran. 12th issue, 1891. Helsingfors. Pp. 166.

This year-book is made up of 102 tables treating of population, agriculture, mining, manufactures, commerce, education, charity, crime, finance, etc. The headings of the tables are printed in French as well as in the native language. Most of the statistics are brought down to the end of 1889. The vital statistics are quite full, and are especially interesting as showing the conditions of life in a region where social and climatic character is in marked contrast with our own.

Statistisk Aarbog for Kongeriget Norge. 10th issue, 1890. Christiania, 1890. Pp. 161.

The population statistics of Norway are not so valuable at the present time, as the last census was taken in 1875, although it should be observed that in the cities an enumeration was taken in 1885. The movement of the population is given for 1888, and statistics of births, marriages, and deaths go back to 1856. By these returns the population appears to be increasing a few thousands annually. The criminal statistics cover the period 1871-88. Other tables, as those for finance and commerce, make a similar survey of a considerable period of time.

Annuaire Statistique de la Suisse. Published by Le Bureau de Statistique du Département Fédéral de l'Intérieur. First year, 1891. Berne. Pp. xiv, 265; two maps.

This work was determined upon in 1887, and represents a great

industry in the meantime. The volume is divided into seventeen chapters, which treat of the area and population, movement of the population, agriculture, live stock, forestry, fisheries, mining, manufactures, telegraph and postal service, commerce, hygiene, accidents, education, finance, prisons, army, and miscellaneous subjects. Complaint is made that for some of these subjects the material from the number of the cantons is scanty, but the attempt is made, and will be insisted upon more in the future, to demand from the several cantons reports which can be reduced to a uniform plan. The report is published in both French and German, is printed on excellent paper, and typographically is arranged with the greatest advantage to the investigator. A note is furnished on the history of the different censuses in Switzerland, which shows in an interesting way the development of census inquiries. The results of the census of 1888 are not yet fully digested, but will appear in a second edition of this annual. Among the interesting summaries are tables showing the average price of wheat in Zurich by decennial periods from 1540-1888; receipts and expenses of government from 1850-88; and telegraphic communication from 1852. These examples are given simply to show that some of the tables cover a considerable period of time, although in most cases the statistics do not go back more than five years. Telephone statistics are given since 1881; and a comparison of railway traffic at four periods, 1868, 1875, 1880, 1888. One of the maps shows the distribution of the population in 1888.

Résumé Statistique de l'Empire du Japon. No. V. Tokio, 1891. Pp. 159; map and chart.

This is the fifth issue of the statistical annual and relates to the years 1888 and 1889. The text is in French and Japanese. The tables concern the subjects of area, population, agriculture, commerce, railways, postal system, banks, education, religion, public hygiene, charity, police, prisons, crime, army and navy, finance, and administration. New tables have been inserted in this number relating to the number of foreigners in Japan, number of Japanese in foreign countries, patents, and results of election of 1890. There is also a map and diagrams showing the number of births and deaths from 1885 to 1889.

The total number of foreigners residing in Japan in 1889 was 9062 as compared with 7117 in 1884. The Americans are represented by

899, and the English by 1701. The Chinese are in the majority with 4975. It is estimated, through reports of the consuls, that 18,688 Japanese were living in foreign countries, some 14,000 living in Corea and the Sandwich islands. In the United States there were 1767, and 152 in England. The birth and death rates in 1889 were 30.90 and 20.60 per 1000; the number of divorces per 1000 inhabitants was 2.77; the number of married couples, 186.29; and the marriage rate 8.65 per 1000. Male births are in excess of females, the proportion being 96 girls to 100 boys. The proportion of still-born was 6.58 to 100 births.

The postal service is extending at an enormous rate. The number of letters sent in 1888 was 135,150,000 as compared with 116,594,000 in 1887, and 48,315,000 in 1879. This is a proportion of 3.95 per inhabitant for the latest year named. The total number of depositors in savings banks in 1888 was 665,822 as compared with 26,473 in 1879.

Annual Statistical Report of the American Iron and Steel Association for 1890. By James M. Swank, Secretary. Philadelphia, 1891. Pp. 80.

This valuable annual contains the usual review of the iron and steel industries with statistics for the year 1890 and immediately preceding years, and also some ten pages of statistics of the foreign iron trade for 1890. The statistical tables are similar to those of previous issues, and therefore require no detailed comment. The statistics show that the pig iron industry did not progress in the southern states in 1890 as rapidly as in 1889. There was a very large increase in the volume of the exports of iron and steel, and the manufactures therefore during the last year, the value being \$27,000,000 as compared with \$23,712,000 in 1889. The imports of iron ore in 1890 were the largest ever made, amounting to 1,246,830 tons. It is estimated that the total consumption of iron ore in the United States in 1890 was 18,000,000 gross tons. Statistics show that neither the Clapp-Griffiths nor the Robert Bessemer process is growing in favor. The total production of crude steel, in the form of ingots or direct castings, in 1890 was 4,277,071 gross tons, and the production of iron and steel rails in the same year was 1,885,307 gross tons.

American Electrical Directory for 1890-91. Published by the Star Iron Tower Co. Fort Wayne, Ind. Pp. 593.

This directory has reached its fifth issue, and, though it contains no

summarized tables, has a large amount of details in regard to the capital and capacity of central station electric light plants.

The Financial Reform Almanac, 1891. London. Pp. 200.

The Financial Reform Almanac has reached its twenty-seventh issue, and during that period has changed considerably the scope of its material. As local government assumes greater importance in English political life, more attention is now given to local financial statistics than formerly. Particularly marked is this emphasis in this issue, and more complete returns of local income and expenditures are furnished than ever before. Complaint, however, is made that no complete account is available for local governing bodies, and that their statistics are very imperfectly collated. Nevertheless, the statistics are very suggestive. Other statistics relate to population, revenue, labor, commerce, etc., the tables in this respect being similar to former compilations though in all cases brought down to date.

Low's Hand-Book to the Charities of London, 55th year, 1891. London. Sampson Low, Marston & Co. Pp. 296.

This annual gives a list of the charitable institutions and societies of London with statistics for each society, of the receipts, and of the number of persons aided. It is stated in the preface that the donations and bequests of 1890 were in advance of those of the preceding year, though they failed to come up to those of 1888. The total sum bequeathed to charitable institutions in the United Kingdom in legacies of £50 and upwards during 1890 was not quite one million pounds. Of this London received nearly one half. The donations in sums of £50 and upwards amounted to £311,000. These gifts are entirely outside of amounts obtained in other ways for charitable purposes.

D. R. D.

STATISTICS OF GERMAN CITIES.

Statistisches Jahrbuch deutscher Städte. By Dr. M. Neefe, Direktor des Statistischen Amtes der Stadt Breslau. First issue. Breslau, 1890.

In co-operation with his brother statisticians in the municipal bureaus of Germany, Dr. Neefe has published a most valuable work of reference of the statistics of the larger cities of Germany. The

work grew out of the conferences of the heads of municipal statistical bureaus, which take place from time to time. Different sections of the subject were assigned to the various chiefs of bureaus, and the general responsibility for the work entrusted to Dr. Neefe.

All German cities having over 50,000 inhabitants, fifty-four in all, are included in the compilation. The information relating to them was collected by all available means. In some cases, as in relation to population, recourse could be had to general statistical publications, in others the special investigations of the municipal bureaus form the source of the data given, while in still others, the figures are based upon replies of the municipal organs to question sheets prepared by the editor.

The successive chapters of the work, from the pens of several writers, as before indicated, treat of natural conditions, population, lots and buildings, dwellings, building operations, street cleaning, sewage and parks, illumination, fire service, industry, transportation, savings banks, public pawn shops, care of poor and sick, police, education, water supply, and, finally, the organization of the municipal administration. This list reveals the rich contents of the volume.

Each author is naturally limited by the material offered to him for classification. Some of the chapters do little more than point out the insufficiency of the statistical data to be obtained. None the less they have the marks of careful preparation, and show an earnest effort to make the most of the available material. Where the material is rich the chapters expand into careful studies of the phenomena in question. This is notably the case in Dr. Boeckh's contribution on the population of the cities, which he compares in an instructive fashion with the population of the country at large.

So far as the general conduct of a city's affairs can be expressed in tables and figures, it has been done in this work. All of those who are interested in the problems of municipal administration, and today their name is legion, will find in these pages much material for study. The editors are to be congratulated on the excellent results which they have secured in spite of the difficulties of the undertaking. Another year may call for some changes in presentation, and may bring forth more matter along certain lines, but for a first issue the book is a signal success, and will be indispensable in the constantly recurring discussions of the scope and policy of municipal administration.

ROLAND P. FALKNER.

FRENCH STATISTICAL ALBUM.

The issue of the *Album de Statistique Graphique* for 1889, published by the Ministry of Public Works, contains twenty-six charts illustrating the industrial and social condition of France for the two preceding years. Heretofore, two years have been required for the collection and arrangement of these statistics, but by the adoption of better methods of work this interval has been reduced by one half. Thus this annual contains results for the two years since 1887. The first thirteen charts are a continuation of the series, annually issued, on the railroad and canal traffic, and require no particular comment.

The special feature of this number consists of seven charts showing the distribution and development of traffic on the national highways, and is worthy of a critical study. Eight censuses of this nature have been made since 1844, and derive their importance from the great annual expenditure required to maintain the system of government roads. It is important to know the distribution of traffic in order to afford a basis for apportioning credits for maintenance, and also to discover the proportion of service rendered. For the collection of these statistics 4734 posts of observation were established, and a period of enumeration was extended to 28 days, distributed equally over the seven days of the week and the four seasons of the year. All traffic is divided into five categories as follows: loaded wagons; public conveyances; private teams and empty wagons; mounted horses and animals in droves; and, fifthly, animals in halter. The unit is the draught horse (collier), and from this is reckoned another unit, the effective ton (tonne utile). The number of gross colliers in each class is then reduced by a proper coefficient to the reduced collier (collier réduit), which is proportioned to the weight of the vehicle and the speed with which it is drawn. It is thus decided that the individuals in the last two categories shall be estimated at one-half of those in the first three classes, and allowance is made accordingly.

The result of this census shows that the average *collier réduit* corresponds to 1295 kilos, gross weight, and 647 kilos of effective weight, thus showing that about one-half of the wear of the roadway is due to the dead weight of the horse and wagon. A comparison of the total volume of road traffic with the railroads and navigable ways is well shown in the following table.

	Length.	Average Tonnage.	Kilometric Tonnage.	Percentage.
Railroads.....	32,128 kms.	323,969	10,409,134,968	68
Rivers and canals	12,499 "	254,394	3,179,676,622	21
Highways.....	37,603 "	45,870	1,734,004,422	11
	82,430 kms.	185,890	15,322,816,012	100

One of the charts shows the increase by departments in road traffic. This indicates a very considerable growth since the last censuses in 1876 and 1882, and one which appears to be in an increasing ratio. The average increase in "colliers" from 1876 to 1882 was 5.08 per cent; and from 1882 to 1888, 8.25 per cent, or an increase of 13.73 per cent in 12 years. This is especially important as disproving the statement, so often made, that the highway is a thing of the past, and that the maintenance of an extended system of state roads is an unnecessary expense.

The only additional feature of this album is six charts showing the increase of travel and trade due to the Exposition at Paris. These show by diagrams the number of visitors compared with the expositions of 1867 and 1878, and the movement of people in the city of Paris and at the frontiers. The last chart shows the relative attendance at the various theatres and shows of Paris, thus bringing out the importance of the Exposition as a source of revenue to the city.

WILLIAM Z. RIPLEY.

PRELIMINARY REPORT OF THE CENSUS OF THE UNITED KINGDOM.

The following paragraphs are condensed from the *Preliminary Report* of the Commissioners of England.

The total number of persons returned as living in England and Wales at 12 p.m. on the 5th of April, 1891, was 29,001,018.

This shows an increase of 3,026,579, or of 11.65 per cent, upon the number returned at the previous enumeration of April, 1881.

Not only was this increase absolutely less than that of the preceding decennium, 1871-81, but the rate of increase was lower than in

any previous decennial period in the century, that is, in any decennium since the first enumeration in this country.

Date of Enumeration.	Number of Inhabited Houses.	Population.		Decennial Rate of Increase per Cent.
		Males.	Females.	
1801, March 10.....	1,575,923	4,254,735	4,637,801	....
1811, May 27.....	1,797,504	4,873,605	5,290,651	14.30
1821, " 28.....	2,088,156	5,850,319	6,149,917	18.06
1831, " 29.....	2,481,544	6,771,196	7,125,601	15.80
1841, June 7.....	2,943,945	7,777,586	8,136,562	14.52
1851, March 31.....	3,278,039	8,781,225	9,146,384	12.65
1861, April 8.....	3,739,505	9,776,259	10,289,965	11.93
1871, " 3.....	4,259,117	11,058,934	11,653,332	13.19
1881, " 4.....	4,831,519	12,639,902	13,334,537	14.36
1891, " 5.....	5,460,976	14,050,620	14,950,398	11.65

The recent decline in the rate of growth may be due to either of two causes, namely, a falling off in the excess of births over deaths, that is, in the "natural increment," or to an increase in the excess of emigrants* over immigrants. As a matter of fact, it was due to both these causes, acting in combination.

For had the excess of births over deaths, or natural increase, been in the same proportion to the population as it was in the preceding decennium, the addition to the population from this cause would have amounted to 3,919,543, whereas it was in fact only 3,630,761, so that there was a falling off of 288,782 under this heading. Again, had the loss by excess of emigrants borne the same proportion to the population as in 1871-81, the decrease under this heading would have been only 189,614, whereas the figures show that it must have amounted to no less than 604,182.

These two deficiencies, namely, the 288,782 from diminished natural increase, and the 414,568 from increased excess of emigrants, together make up the 703,350, by which the enumerated population falls short of the number estimated on the hypothesis of a maintenance of the preceding intercensal growth.

The decline in the natural increase was not due to increased mor-

* "Emigrant" as used in this report includes: (1) Emigrants proper, that is, persons who have left the country to establish themselves outside Europe. (2) Persons who have gone abroad as travellers, etc. (3) Persons who have migrated from England and Wales to other parts of the United Kingdom. (4) Any persons who died in the decennium, but whose deaths were not registered at the date of the enumeration.

"Immigrant" of course is used to include the opposites of these groups.

tality, for the mean annual death rate in 1881-91 was lower than in any earlier decennium, but to a persistent decline in the birth rate, which, as the following table shows, was unprecedentedly low:—

Intercensal Periods.	Increase per Cent by Births.	Decrease per Cent by Deaths.	Gain per Cent by Excess of Births over Deaths or Natural Increase.
1841-51	34.64	23.73	10.91
1851-61	36.19	23.58	12.61
1861-71	37.56	23.96	13.58
1871-81	37.89	22.80	15.09
1881-91	34.26	20.28	13.98

To each 100 males enumerated there were 106.4 females. The proportion of females to males has been steadily increasing at each census since 1851, having been successively 104.2, 105.3, 105.4, 105.5, and 106.4 to 100.

The rate of increase in the last decennium was 11.2 per cent for males, and 12.1 per cent for females. But the "natural increment" of the males, that is the number of male births *minus* the number of male deaths, was 1,821,366, or 14.5 per cent of the male population in 1881, while the natural increment of the females was 1,809,395, or 13.6 per cent of the female population. From this it follows that the 604,182 persons who constituted the balance of emigrants over immigrants consisted of 410,648 males and 193,534 females, and that the increased proportion of females in the population was due entirely to the excess of male emigrants. Had there been neither emigration nor immigration the females would have been only 104.7 to 100 males.

The increase of population was by no means equably spread over the country. In 271 of the 632 registration districts into which England and Wales are divided for registration purposes the returns show an actual falling off in the number of inhabitants, and in 202 out of these 271 districts there had also been a decline of population between 1871 and 1881.

The terms urban and rural are habitually used without any such precise meaning as would enable a clear line of demarcation to be drawn between the two. For statistical purposes, however, some strict definition must be adopted; and probably it will be best, as certainly it will be most convenient, to define the urban population as

the aggregate inhabitants of London and the urban sanitary districts, the remainder of the population constituting the rural population.

Urban Sanitary Districts, with Population of —	Number of Districts.	Aggregate Population 1891.	Mean Percentage of Increase of Population, 1881-91.
250,000 and upwards.....	6*	6,375,645	9.1
100,000 to 250,000.....	18	2,793,625	19.1
50,000 to 100,000.....	38	2,610,976	22.9
20,000 to 50,000.....	120	3,655,026	22.5
10,000 to 20,000.....	176	2,391,076	18.9
3,000 to 10,000.....	453	2,609,141	9.6
Under 3,000.....	195	367,282	2.6
Total.....	1,006	20,802,770	15.3

* Including the Administrative County of London, which is here reckoned as one district.

The population of London, meaning thereby the London of the Registrar-General, which with an insignificant exception* coincides with the administrative county of London, was 4,211,056, showing an increase of 395,512, or 10.4 per cent upon the population of 1881. Thus the population of London increased in a somewhat lower ratio than the population of England and Wales as a whole; and the fact is notable, inasmuch as it is the first time that such a phenomenon has presented itself, London having been found in every preceding intercensal period to have gained more or less in its proportions as compared with the country at large.

PROPORTION OF POPULATION IN LONDON AT THE TEN ENUMERATIONS.

Year of Enumeration.	Persons in London to 100 in England and Wales.
1801	10.78
1811	11.20
1821	11.49
1831	11.91
1841	12.24
1851	13.18
1861	13.97
1871	14.33
1881	14.69
1891	14.52

* The civil parish of Fenge is included in the administrative county of London but not in registration London.

POPULATION OF THE UNITED KINGDOM.

The total population of the United Kingdom consisted on April 6th last of 37,740,283 persons. This was an increase of 2,855,435 upon the enumerated population in 1881, and was equivalent to an average daily addition of 781 persons to the community throughout the decennium, the daily addition having been 931 in 1871-81 and 701 in 1861-71.

	Enumerated Population of the United Kingdom at successive Censuses, 1881-91.		Increase or Decrease per Cent of the Population in 1871-81, 1881-91.	
	1881.	1891.	1871-81.	1881-91.
United Kingdom.....	34,884,848	37,740,283	10.8	8.2
England.....	24,613,926	27,482,104	14.5	11.7
Wales.....	1,360,513	1,518,914	11.8	11.6
Scotland.....	3,735,573	4,033,103	11.2	8.0
Ireland.....	5,174,836	4,706,162	— 4.4	— 9.1

NOTE.— Where no minus sign is prefixed the figures denote an increase.

The population of the islands in the British seas was as follows : —

	1881.	1891.
Islands in the British Seas.....	141,260	147,370
Ile of Man.....	53,558	55,598
Channel Islands —		
Jersey.....	52,445	54,518
Guernsey (with Herm and Jethou)	32,638	35,339
Alderney.....	2,048	1,843
Sark.....	571	572

The population of the different provinces in Ireland was : —

Provinces.	Number of Persons in 1891.	Decrease between 1881 and 1891.	Rate per Cent
Leinster.....	1,195,718	83,271	6.5
Munster.....	1,168,994	162,121	12.2
Ulster.....	1,617,877	125,198	7.2
Connaught.....	723,573	98,084	11.9
Total of Ireland.....	4,706,162	468,674	9.1

The following table shows the religious professions, so far as ascertained, in Ireland in 1891:—

		Religious Professions.						
		Roman Catholics.	Protestant Episcopalians.	Presbyterians.	Methodists.	Jews.	All other Professions.	Information Refused.
Total of Ireland { 1881..		3,960,891	639,574	470,734	48,839	472	53,796	530
{ 1891..		3,549,745	600,830	446,687	55,235	1,788	50,165	1,702
Increase or decrease between 1881 and 1891.....	Number...	Decrease. 411,146	Decrease. 38,744	Decrease. 24,047	Increase. 6,396	Increase. 1,326	Decrease. 3,631	Increase. 1,172
	Rate per cent. }	Decrease. 10.4	Decrease. 6.4	Decrease. 5.1	Increase. 13.1	Increase. 280.9	Decrease. 6.7	Increase. 221.1

AMERICAN STATISTICAL ASSOCIATION.

NEW SERIES, No. 16.

DECEMBER, 1891.

THE CENSUS ENUMERATION IN PRUSSIA.

BY CARL C. PLEHN, PH.D.

The methods followed in the Prussian census of December 1, 1890, were essentially the same as those which have been used by the Royal Statistical Bureau in Berlin since 1871, and which were then adopted in accordance with resolutions of the "Commission for the further extension of the statistics of the customs union¹ (*Zollverein*)."

The complications and difficulties in enumeration, arising from the density of population in large cities, have led to the employment in Germany of two slightly different methods, one for the country at large and the smaller municipalities (where the limit may be set at about 40,000 inhabitants), and a slightly more complicated system for dealing with larger municipalities. We will consider these two systems separately, taking first that for the country at large, and then illustrate the workings of the second from the city of Berlin.

¹ cf. Blenck. Die Volkszählung vom 1. Dezember, 1885. *Zeitschrift des königlich preussischen statistischen Bureaus*. 1888. Heft I-II.

I. THE ENUMERATION IN THE COUNTRY AT LARGE.

A. *Officers of the census.*

These may be classed in three groups:—

1. The Royal Statistical Bureau in Berlin (*das königliche statistische Bureau in Berlin*), a permanent office, which has the general charge of the census, plans for and provides the necessary schedules, etc., and transmits its instructions through the provincial authorities to—

2. The chiefs of the local government bodies (*Gemeinde- or Gutsbezirk-Vorstände*). These may decide whether to carry out the work themselves, as is the case in small towns, or to appoint, as in all larger centres, local census commissioners (*Zählcommissionen*). The latter are to “serve without emolument, being persons in a position to grasp the importance of the census, and willing to conduct the enumeration, and at the same time possess the confidence of the people and a knowledge of the locality” (quoted from the official instructions). The duties of these commissioners, or of the local government boards in case no commissioners are appointed, are: (1) to lay out the enumerators’ districts; (2) to appoint and instruct enumerators; and (3) to correct and control the work of the enumerators, fill out the general schedule, and transmit all the papers, etc., to the central office.

It will be remembered that the larger cities in Prussia are in police matters under the direct control of the royal state police. In all such cities the police are to act in common with the local commissioners and the local government boards. The extent of the assistance thus rendered by the police will be best seen when we come to examine the methods in Berlin.

3. The third group is that of the enumerators and their substitutes in case of detention. These are all volunteers, “who esteem the honor of being called upon to serve the country in this capacity a sufficient emolument for their

pains." This claim of the census authorities needs, however, to be modified by the statement that many of these so-called volunteers are directly or indirectly connected with the civil service of the local governments, and are excused from their other duties for the time necessary to do the work of the census. Thus, in Berlin a large number were men holding honorary, *i. e.*, unpaid, offices under the city. Not a few are school teachers. There can be no doubt, however, that the census authorities obtain in this way a body of unusually intelligent, conscientious, and efficient enumerators.

The districts assigned each enumerator and his substitute, who often acts as his assistant, are very small. They are to be "so bounded that they shall not, as a rule, include more than forty households."

In cases where volunteers cannot be found the local authorities are bound to provide enumerators at their own expense. In such cases only more than one district may be assigned a single enumerator. The duties of the enumerator are to distribute the schedules, which are to be filled out by the people, to collect them again, and correct by inquiry or otherwise any mistakes apparent in them, or add to them where incomplete, and to fill out the general schedules for his district.

B. The scope of the inquiry.

It was recommended by the above-mentioned Commission that no questions should be connected with the population census and placed upon its special schedules which did not apply to the special conditions of the people counted. All other questions, as, for example, those general problems connected with agricultural and business interests, in as far as these were not necessary in order to ascertain the employment of the people counted, are left to be investigated by some other method less likely to produce confusion. A single exception to this general rule is the question of dwelling place, which can the more easily be included, as the enumeration must take place from house to house.

Within these limits each local government is permitted to make on its own responsibility "any changes in the schedules which will tend to ensure the final equality of the results." This important exception permits the printing of schedules and explanations in the language of the province, and similar changes.

It is further permitted that a number of large cities of over 48,000 inhabitants may on special request make certain additions to the general schedules for municipal purposes. The nature of these special additions, in the case of the city of Berlin, will be considered at the end of this article.

C. The schedules and other papers distributed.

All the schedules, instructions, and other papers issued are marked in order by letters of the alphabet, and it will be conducive to clearness if we retain the same letters whenever it may be necessary to refer to the different papers.

The population schedules which are distributed from household to household by the enumerators, sometime between the 28th and the 30th of November, to be filled in by the head of each family and returned to the enumerators after 12 o'clock noon on the first of December, consist of three distinct parts:—

(1). The population schedules A, one for each member of the household present. The enumerator must ascertain the required number by inquiry at the house before November 30, and leave exactly that number. A slightly different schedule printed on pink paper and lettered *a* is to be used for members of the household temporarily absent.

(2). Household schedule B.

(3). The census letter, or circular of instructions D, addressed to the head of the household and containing the explanations C. This circular is to be folded around the required number of schedules A and *a*, and one of schedule B as a wrapper for distribution.

We will now examine these schedules individually.

(1). Schedule A entitled "Schedule for those present in the household," bears three numbers, thus: "Schedule No. . . . of Circular No. . . . of District No. . . ." The first refers to its place in the household list, and the second is the number of the household in the order visited by the enumerator. For further identification of the schedule a blank is left for the insertion of the name of the city, the town, or the village, and of the administrative circle (*Kreis*).

The schedule contains the following twelve questions:—

1. Given and surname?
2. Relation or other connection to the head of the household?
3. Sex?
4. Age? and, if possible, day of the month and year when born?
5. Conjugal condition?
6. Calling, trade, profession, business, or means of sustenance?
 - (a) Name of calling?
 - (b) Position or rank in trade?
7. Birthplace?
8. Member of army and navy in active service, charge and company?
9. Religion?
10. Citizenship?
11. Mother tongue?
12. Home address of persons only temporarily present?

Questions 3, 5, and 11 are followed by a list of all possible answers, the correct ones to be underlined.

Schedule *a* reads the same as schedule A except that the title is ". . temporarily absent," and that the questions 9–12 are not included.

(2): Schedule B, the household schedule, or check list for each family, has two numbers, thus: "Household schedule of Circular No. . . . District No. . . ."

It is to contain a list of all members of the family according to surname and given name, relationship, or other connection to the head of the family, separated under the following heads: (1) Members present in the household.
a. Regular members, male or female; *b.* Only temporarily

present, male or female. (2) Members temporarily absent, male and female. (3) Religion.

Every person for whom a separate schedule A or *a* has been filled out must be included in the household list B, and, on the other hand, the first numbers of schedules A and *a* must correspond with the numbers beside the same names on the household list.

At the bottom is a voucher for the accuracy of the returns to be signed by the head of the household, or failing that by the enumerator.

(3). The census letter, or circular D, is a long sheet of paper folded in three parts and containing, on the inside, elaborate and minute instructions for filling out the schedules, a work, be it borne in mind, to be done by the heads of the families. On the outside are two specimen copies of schedules A and B filled out, and in the middle are blank forms for addressing the whole to the head of the household, and spaces for recording how many of schedules A and *a* and of B have been enclosed, for it will be remembered this was to be wrapped round the required number of schedules for each family. At the bottom is an appeal in the name of the local authorities urging upon the head of the household the importance of the census and the necessity of filling out the blanks properly.

Of the instructions contained inside the circular D and designated c we will note only the more important. The head of each household, or family, is responsible for filling in the schedules and for seeing that all members of the household are counted. By a *household* is meant all the persons occupying in common the same dwelling and eating at the same table. Persons living alone in a separate dwelling and maintaining a separate table are to be treated as a household of one. Lodgers, hotel guests, and the like are to be included in the household of their host. A somewhat anomalous case, and one difficult to classify, was that of the students. The German student generally occupies rooms

sublet to him by a tenant, has his early morning coffee and his evening meal brought to him in his room by his landlady, and goes out to the restaurant for his breakfast (*frühschoppen*) and midday dinner. He is therefore much like any other lodger except as regards two meals. It was decided, however, in Göttingen, and I believe also in most other university towns, to consider each student as a household of one, that is, as a family of which he is the head and sole member. The question of what shall and what shall not constitute a household is chiefly technical in its character.

The persons to be counted are all those without exception who passed the night from Nov. 30 to Dec. 1 in the household, and also all those regular members of the household who are temporarily absent, without having given up their regular abode. Travellers, railroad and postal officials, and the like, who did not pass the night in any household are to be counted in the household where they arrive on the morning of the first of December. Should they not arrive at any household up till noon of December 1, they would still be covered by the temporarily absent schedule *a*. As the census *theoretically represents the exact state of the population at 12 o'clock midnight of the night of Nov. 30 to Dec. 1*, all children born during the night after 12 o'clock are not to be counted, nor persons dying before that hour.

Under the instructions for answering the several questions we note especially the following: under Question 4 is sought the exact date of birth, and only in cases where it is impossible to ascertain that the age in years. The value of this for the accurate calculation of mortality tables is well known. Under Question 6 the richness of the German vocabulary, in terms to designate not only all callings and trades but also the exact position of each individual in his trade or calling, obviates most of the difficulties met by English statisticians, and does away with the necessity for long instructions on this point.

Each enumerator receives a copy of the special instruc-

tions to enumerators E and a check list F. In this check list he is to enter a list of all the buildings in the district, of the households in each building, and the number of persons belonging to each and included in the different census letters D. The regular method of procedure for the enumerator would be first to make a round of his district, check list in hand, and record first the buildings by street and number; second, the number of households in each building by name of the head of the household; third, the number of members of each family. He would then return home, and with this preliminary count as a basis make up and address to the heads of the families his little packages of schedules for distribution. Many of the enumerators, however, saved themselves one trip by distributing the schedules at the same time they made up the list F.

A summary for each community is made out in form G. In this each enumerator's district is designated and its contents are entered by the local commissioners, and from this the preliminary returns are estimated.

D. Summary.

The chief points to note in connection with the taking of the Prussian census are: 1. The work is done by the local officials, assisted by a volunteer corps of unpaid commissioners and enumerators. 2. The schedules are filled out by the heads of the various families counted, according to the instructions given them at the time. 3. The system of checks on the accuracy of the contents of the separate population schedules, in the household schedule and enumerators' check list, enable most errors to be detected and many of them to be corrected without referring back to the household in question.

As to the accuracy with which the schedules were filled out I can speak from personal knowledge, having had the privilege of examining a large number of the schedules from the city of Göttingen. They were in general filled out with

accuracy and intelligence,—such errors as were found being mostly of a technical nature, or on a question of doubt. Nowhere was there *any trace of a malicious intention* to falsify the returns, or to treat the work of filling out the schedules other than as a serious duty to be willingly rendered. In some cases, but these were the small minority, where the returns had been insufficient, the schedules had been completed by the enumerator himself. Only in a very few cases did the schedules come in soiled or torn. Not a few of the cards showed by the handwriting that the scribe had been a school boy or girl, and these were generally cases of the greatest neatness and accuracy.

One very great guarantee for the accuracy of the work in general is in the fact that the enumerators have each a small district, generally that in which they reside, and are often, from the nature of their regular calling, as, for instance, the school teachers noted above, intimately acquainted with the families in their districts.

II. SPECIAL METHODS IN LARGE CITIES AS ILLUSTRATED BY BERLIN.

As we have already noted, the exigencies of city life make many changes in the above methods advisable, and the nature of these changes will be most readily appreciated if we take the city of Berlin as an example. It is not to be inferred, however, that the same methods were pursued in all the other large cities of the kingdom, for this is not so. Each had its own difficulties to contend with, and each had its own way to meet them. But Berlin is decidedly the most interesting example we could choose, and will serve well to indicate the nature of the changes made.

The counting of the thousands of human beings packed into the large tenement houses of Berlin could not safely be left to chance volunteers from any and all parts of the city. The enumerators must be carefully selected, and, if possible,

found on the spot. Nor could such a large number of enumerators, as would be necessary, do their work well under mere general instructions. Each group of them must be under some direct and efficient control. This is the form in which some of the difficulties which had to be contended with in Berlin presented themselves to the minds of the census authorities.

To offset these difficulties there were some special advantages. Thus, the police keep a complete and accurate list of all the people resident in the city, with their addresses. The extreme care with which this list is kept up is known to all who have spent any length of time in a large German city. This list would form a sound basis on which to start the enumeration, and, according to the general law above cited, the police are obliged to assist.

A. *The officers of the census in Berlin and their functions.*

1. The City Statistical Office (*statistisches Amt der Stadt*), a permanent bureau, like its rival and superior, the Royal Bureau. This has the preparation of the schedules, the general supervision of the work, and the collating of the results.

2. The City Census Commission (*städtische Volkszählungs-Commission*), consisting of four members from the city executive department (*Magistrat*), eight from the city representatives (*Stadtverordnete*), together with the chief of the city statistical office, at present the well-known statistician Dr. Böckh, and a police commissioner (*Commissar des königlichen Polizei-Präsidii*); in all 14. The primary division of the work is according to the 82 police wards, which the commissioners divide among themselves for supervision. The commissioners appoint for each ward —

3. A Ward-deputy (*Revier-Deputirten*), who has the assistance of a police-deputy appointed by the president of police and of the chief of the ward police. Their duties are (1) to divide the 82 wards into yet smaller districts, which is done

on the basis of a list of the buildings in the ward, designated schedule K, provided by the police (of this list we shall have occasion to speak further on); and (2) to appoint for each district —

4. A District Commissioner (*Districts-Commissar*). These gentlemen are to be chosen from the list of those persons who hold honorary, *i. e.*, unpaid, offices in the city government, as well as from others who have volunteered to take part in the census work. When possible they are residents of the district, or at least of the ward. The district commissioner then subdivides his district into enumerator districts, making each piece of real estate a separate district, the house or houses standing on the same building lot forming an enumerator's district. He then sends to the owner of each parcel of real estate, or, in case the owner does not reside on the property, to his agent (in Berlin the owner of a large tenement house is obliged either to live on the place or to have a responsible representative or agent there), a schedule L to fill in, which shall give the number of families resident in his building. The district commissioner appoints an enumerator for each estate, or where the buildings are small for two or more adjoining estates. In the large tenement houses the enumerator would be not infrequently the owner or his representative, and always, where possible, some one residing in the house.

We have therefore five groups of census officers: 1. City statistical office. 2. City census commission. 3. Ward-deputies and the police assistants. 4. District commissioners. 5. Enumerators. The man who is really responsible for the work of enumerating, and who corresponds most nearly to the enumerators in the country at large, is the district commissioner. The enumerators only play the part of his assistants.

B. The extent of the preparatory work.

We have seen that before the district commissioner sets his enumerators to work a certain amount of preparatory work

has been done, opening up the ground. This consists of the two schedules mentioned above, K and L. The first is a list furnished by the ward-deputy, and made up from the police and other records of all the buildings in his district, and of the number of families in each. The second, which he gets each house owner or his agent to fill out, gives him a list of the families in the building and the number of persons in each family.

When this preparatory work has been completed, and with the material thus won as a guide and check, there follows the distribution of the population and other schedules by the enumerators and their collection in exactly the same manner as already described for the country at large, except that the district commissioner directly oversees the work of the enumerators.

We note in passing an extra schedule J, called the estate schedule, which is filled in by the owner and gives a description of the buildings, the number of tenements, and uses other than as dwellings to which rooms are put.

To sum up, the district commissioner receives, as we have seen, preliminary information, as to the inhabitants of his district, from two distinct sources: (1) from the schedule K filled out by the police; (2) from the preliminary house schedule L filled out by the house-owner.

The difficulties which we noted at the beginning of this part were met by the introduction of two sets of officers between the local commissioners and the enumerators, namely, the ward-deputy with his police assistants, and the district commissioners.

The questions asked in Berlin were the same as those for the country at large with some important additions. We will pass now to a consideration of these additions.

C. Additional questions for Berlin.

On population schedule A there were 5 questions added:—

13. Since when resident in Berlin?

14. Connected with which religious congregation in the city? (Some 12 are named).

15. In case of independent business concerns : —

(a) How many employees?

(b) Is business carried on by partnership? If so, state the firm's name.

(c) Do you belong to a guild? If so, to which?

16. Blind? Deaf and dumb?

17. In the case of children less than one year old state : —

Until when has the child been brought up on mother's milk? On nurse's milk? How long, or until when, on animal milk? How long on some substitute for milk? On other food?

More important, perhaps, but at least more numerous, are the additions to the household schedules B which refer to the dwelling accommodations in Berlin.

These are eight questions : —

1. Are you owner of this house? or renter of this dwelling? or is it sublet to you? or do you live rent free as official, as employee, or otherwise?

2. Is the dwelling in the cellar, the ground floor, or up 1, 2, 3, 4, or 5 flights?

3. How many rooms in your dwelling? how many are heatable? not heatable? how many have windows on the street? is there any business carried on in your rooms? if so, in how many?

4. Has your dwelling, besides the above, a kitchen? or do you share the kitchen with other families? has your dwelling a store-room? bath-room? presses? attic? servant's rooms?

5. Do you use, besides the rooms noted in 3 and 4, any special rooms in the house as stores? as public house or restaurant? as office? as business and store-rooms? as workshops or factory rooms? as depot, coach-house, or stable?

6. Is the water system used in the dwelling? if so, in common with other families? has the dwelling bathing facilities and water closets? if so, are they in common with other families?

7. *Yearly rental of the dwelling (including extras) in marks? in case of owners, rent free, etc., estimated rental in marks? yearly rental of separate business rooms in marks?

8. *Since when have you occupied this house? (year and month).

This thorough investigation of how the population of Berlin is housed will undoubtedly give us some interesting results. The weak point is Question 7. The returns on this

* In the schedules questions 7 and 8 bear the numbers 8 and 9, number 7 being apparently omitted.

point may, however, be corrected by comparison with the tax list, for the rent tax (*Miethssteuer*) and the house tax (*Haussteuer*).

III. THE COST OF THE CENSUS.

In conclusion it might be interesting to note the estimated cost of doing the work. The final accounts for the census of 1890 cannot be had probably until next spring, but the amount is not expected to greatly exceed that of 1885, which was 505,300 marks, or a per capita expenditure of 1.78 pfennigs, about 4.3 mills. This is less proportionately than it was in 1880, 1.83 pfennigs, and much less than in 1875, 2.27 pfennigs, or a trifle over half a cent. This estimate does not include, however, the cost of printing the results. It must not be forgotten also in this connection that the large body of census workers is unpaid. The only labor included in the above sums was that of extra clerks in the Berlin statistical bureau. Some few incidental expenses were also borne by the local governments.

The value of this census is greatly enhanced by the fact that practically the same methods have been in use since 1861, and in general the same questions asked.

A PLEA FOR THE AVERAGE.

BY GEORGE K. HOLMES.

An attempt is made in this article to limit, define, and defend the use of the average, which seems to have fallen into some disrepute among theoretical statisticians. Too much reliance has no doubt been placed on the average as expressing the import of statistical details, partly because of its striking and condensed form, and partly because classification has been overlooked in the collection and tabulation of details; but, after all, this average has a use for which no substitute can be found, and may be indispensable to a complete consideration of a subject from a statistical point of view. This will appear upon taking a collection of kindred facts and treating them with different degrees of generalization. The mortgage statistics recently published by the United States Census Office afford the material.

During the ten years 1880-89, 612,249 real estate mortgages were made in Illinois to secure a debt of \$870,699,940 at many rates of interest; and in Kansas, during the same time, 654,243 mortgages were made to secure a debt of \$498,653,903. In tabulating these mortgages for rates of interest, the most detailed classification makes a group of the mortgages bearing each rate, the most useful arrangement of rates being progressively from the lowest to the highest, as is shown in Table I. In this form the results stand as groups of bare facts, and without further treatment the two states cannot be intelligently compared with each other. It is, however, a classification that should be given to the public. Somebody, for some purpose, may want to know how much debt was incurred during the period at the rate of six per cent, or some other rate; or he may wish to make computations, the character of which no one foresees, or which, if foreseen, may not be of sufficient public or scientific interest to be made by the government office.

TABLE I.
NUMBER AND AMOUNT OF REAL-ESTATE MORTGAGES MADE DURING THE 10 YEARS
1880-89, BEARING SPECIFIED RATES OF INTEREST, FOR ILLINOIS AND KANSAS.

Rates of Interest.	Illinois.		Rates of Interest.	Kansas.	
	Number.	Amount.		Number.	Amount.
Total.....	612,249	\$870,699,940	Total.....	654,243	\$498,653,903
0.0 per cent.	587	859,595	0.0 per cent.	69	79,184
1.0 "	31	34,606	1.0 "	16	9,160
2.0 "	28	41,834	2.0 "	21	10,551
2.5 "	3	515	2.5 "	4	4,114
3.0 "	106	177,394	3.0 "	27	23,108
3.5 "	6	8,414	3.5 "	2	1,730
3.8 "	1	4,000	3.7 "	1	600
4.0 "	694	1,929,008	4.0 "	95	190,103
4.3 "	2	7,300	4.5 "	2	2,400
4.5 "	11	47,799	5.0 "	408	511,145
5.0 "	10,033	38,732,067	5.3 "	2	16,400
5.2 "	2	6,000	5.5 "	28	93,125
5.3 "	3	11,250	6.0 "	22,760	22,447,811
5.5 "	241	493,481	6.3 "	41	52,393
5.7 "	2	5,600	6.5 "	710	1,051,089
5.8 "	1	2,250	6.7 "	2	3,300
6.0 "	151,289	342,026,561	7.0 "	68,145	57,922,333
6.3 "	20	56,400	7.3 "	3	4,581
6.4 "	1	4,000	7.5 "	976	1,143,446
6.5 "	2,202	5,984,703	7.8 "	12	13,400
6.6 "	1	300	8.0 "	143,017	135,350,810
6.7 "	8	28,800	8.1 "	1	300
6.8 "	33	119,290	8.3 "	43	50,565
7.0 "	154,269	234,474,003	8.5 "	2,261	2,657,795
7.1 "	2	4,000	8.8 "	3	2,850
7.2 "	657	516,627	9.0 "	112,631	101,976,951
7.3 "	24	52,302	9.3 "	3	3,250
7.4 "	4	1,521	9.5 "	408	301,559
7.5 "	1,632	2,965,294	10.0 "	225,647	138,121,286
7.8 "	1,862	1,124,898	10.3 "	1	4,250
8.0 "	287,455	239,672,028	10.5 "	657	325,457
8.3 "	1	600	10.6 "	1	250
8.5 "	2	1,600	10.8 "	1	5,000
8.8 "	1	5,000	11.0 "	4,011	3,336,016
8.9 "	1	100	11.4 "	1	350
9.0 "	44	71,471	11.5 "	10	3,150
9.2 "	2	600	12.0 "	71,464	32,537,363
9.3 "	1	800	12.5 "	9	2,883
10.0 "	932	1,171,215	13.0 "	262	225,437
10.5 "	1	500	13.5 "	1	1,755
11.0 "	5	1,800	14.0 "	40	38,936
12.0 "	46	52,148	15.0 "	48	24,333
15.0 "	1	50	16.0 "	21	11,048
16.0 "	1	1,216	18.0 "	347	79,877
18.0 "	1	1,000	19.0 "	1	400
.....	.....	.....	20.0 "	5	915
.....	.....	.....	24.0 "	15	7,949
.....	.....	.....	25.0 "	2	400
.....	.....	.....	30.0 "	1	600
.....	.....	.....	36.0 "	5	1,200
.....	.....	.....	48.0 "	1	500
.....	.....	.....	60.0 "	1	475

In the next effort at digestion the rates may be grouped, and the form of the table permits everyone to do his own grouping; but, whatever it may be, the groups will have little significance unless they are represented by percentages of the total. Or the grouping may be omitted, and each class of Table I may be represented by a percentage. The grouping of rates may have several plans, one plan being as follows: under 5 per cent; 5 and under 6 per cent; 6 and under 7 per cent, etc. Another plan is suggested by Prof. Richmond Mayo-Smith in the *Quarterly Journal of Economics* for July, 1888, and is this: 10 per cent and over; 9 per cent and over; 8 per cent and over, etc.

Table II combines the three plans and condenses the classes

TABLE II.

PERCENTAGE OF NUMBER AND AMOUNT OF REAL-ESTATE MORTGAGES MADE DURING THE 10 YEARS 1880-89, BEARING SPECIFIED RATES OF INTEREST, FOR ILLINOIS AND KANSAS.

Rates of Interest.	Illinois.		Kansas.	
	For Number.	For Amount.	For Number.	For Amount.
Under 6 per cent.....	1.92	4.87	0.10	0.19
6 "	24.71	39.28	3.48	4.50
7 "	25.20	26.93	10.41	11.62
8 "	46.95	27.53	21.86	27.14
10 "	0.15	0.13	34.49	27.70
6 to 8 "	97.91	94.98	36.02	43.72
Over 6 "	73.37	55.85	96.42	95.31
" 8 "	0.17	0.15	63.88	56.09
" 10 "	0.01	0.01	11.76	7.34
" 12 "	0.00	0.00	0.12	0.08

of Table I to 10 groups, and presents them in the form of percentages. Here detail is not entirely lost, and for the given particulars the two states may be compared. For instance, take a class of mortgages bearing but a single rate of interest. Of the total number of mortgages made in Illinois, 24.71 per cent bore interest at 6 per cent, and their amount is 39.28 per cent of the total amount; in Kansas this class is represented by 3.48 per cent for number, and 4.50 per cent for amount.

An illustration of grouping may next be noticed. 0.17 of 1 per cent of the total number of mortgages made in Illinois during the ten years bore interest rates higher than 8 per cent, and these mortgages secured 0.15 of 1 per cent of the total amount of debt incurred. For Kansas the number of mortgages in this class is 63.88 per cent of the total number, and their amount is 56.09 per cent of the total amount. This class has a precise limit at the smaller extreme, but not at the greater.

The class of mortgages bearing interest at 6 to 8 per cent, inclusive, has more than one rate, and has precise limits at the extremes. The number of these mortgages is 97.91 per cent of the total number in Illinois, and their amount is 94.98 per cent of the total amount. In Kansas 36.02 per cent stands for the number, and 43.72 per cent for the amount.

It may not be advisable to adopt solely the plan of converting the number and amount of each rate into a percentage, nor solely to combine the rates into classes of defined limits, as from 6 to 8 per cent, inclusive; nor yet merely to classify with a defined limit at one extreme only, as at rates of over 8 per cent; the character of the data, the space at one's command in the report, and the amount of work required must determine which method shall be adopted; but, whatever is determined upon, amount as well as number, and number as well as amount, should be included in the grouping and the percentages.

Something is still lacking in our understanding of interest on mortgages in these two states of Kansas and Illinois, after an examination of Tables I and II. The facts are shown in detail, and are shown and interpreted in condensed detail, but a final interpretation without any detail at all has not been reached. A broad, general view of the subject cannot be obtained until details are entirely merged in an average.

There is a great change in the character of the statement when we pass from one in which appears every rate of interest borne by the 612,249 mortgages made in Illinois to the

statement that the average rate of interest for these mortgages was 6.78 per cent. Neither statement can be a substitute for the other, and both are necessary. By means of an average a conclusion is now reached in regard to these mortgages, in which every one of them has an effect. At one extreme was the presentation of every detail; at the other, all details lost. The average of 6.78 per cent conveys an idea of general level, and expresses in regard to the rate of interest the most comprehensive conclusion derivable from the particulars.

This average does not pretend that any mortgage bore the rate of 6.78 per cent, nor that the principal class of mortgages had a rate nearly the same as this one. It is left to the table of details (Table I) to show how great or little the variations are from the average. It depends upon the object that a writer has in view whether he shall use details, such as are exhibited in Table I; or use a limited generality, as that 0.15 of 1 per cent of the mortgage debt incurred in Illinois during the ten years bore interest rates higher than 8 per cent; or whether he shall refer to a general truth that all the details of fact combine to establish, namely, that the entire incurred debt of \$870,699,940 was subject to an interest charge which was 6.78 per cent of itself.

How well the average fulfills its purpose is shown in Table III. The general level of the rates of interest to which the

TABLE III.

AVERAGE ANNUAL RATES OF INTEREST BORNE BY THE REAL-ESTATE MORTGAGES
MADE DURING THE TEN YEARS 1880-89 FOR ILLINOIS AND KANSAS.

Years.	Percentages.	
	Illinois.	Kansas.
Total.	6.78	8.83
1880	7.39	9.47
1881	6.96	9.20
1882	6.77	8.98
1883	6.84	8.97
1884	6.92	8.89
1885	6.87	8.86
1886	6.69	8.86
1887	6.67	8.71
1888	6.68	8.80
1889	6.53	8.48

debt of \$498,653,903 incurred in Kansas during the ten years was subject was 8.83 per cent, and this affords a decisive comparison of an all-comprehensive character with the Illinois average of 6.78 per cent. By finding the average rate for each of the ten years for the two states, it is discovered whether the general level of the rates of interest is rising or lowering, and how the states compare in this respect.

The average of the Illinois rates for 1880 was 7.39 per cent. It declined to 6.77 per cent in 1882; then increased to 6.92 per cent in 1884, after which year the decrease was unbroken to 6.53 per cent in 1889, with a slight exception from 1887 to 1888. In Kansas the average rate of 1880 was 9.47, and, excepting an increase of 0.09 of 1 per cent from 1887 to 1888, there was a constant decrease to 8.48 per cent in 1889. The general level of the rates of interest on real-estate mortgages in Illinois was lowered by 0.86 of 1 per cent during the decade, and in Kansas by 0.99 of 1 per cent.

The study of interest rates in these states cannot dispense with any one of the three tables herewith presented. It is not enough to know only the details of fact in Table I, which might have been expressed for each year; nor enough to know only the results of such a condensation of these facts as is found in Table II, which also might have been expressed for each year; nor yet enough to know merely the averages of Table III. A complete statistical presentation requires the full analysis of Table I, the reduced analysis and partial synthesis of Table II, and the final synthesis of Table III. It is believed that the foregoing demonstrates that, when accepted for what it truly means, an average has a value beyond what it is sometimes credited with having, and that, as a concise and comprehensive expression of general significance, there is reason why it may be used, as it is, for popular understanding, without analysis.

REVIEWS AND NOTICES.

REPORTS OF HEALTH AND VITAL STATISTICS.

CONNECTICUT. *Thirteenth Annual Report of the State Board of Health for the year ending November 30, 1890, with the Registration Report for 1889 relating to Births, Marriages, Deaths, and Divorces.* New Haven, 1891.

INDIANA. *Ninth Annual Report of the State Board of Health for the fiscal year ending October 31, 1891; and Annual Report of the Bureau of Vital and Sanitary Statistics.* Indianapolis, 1891.

KANSAS. *Fifth Annual Report of the State Board of Health, ending December 31, 1889.* Topeka, 1890.

MASSACHUSETTS. *Twenty-Second Annual Report of the State Board of Health.* Boston, 1891.

MICHIGAN. *Seventeenth Annual Report of the Secretary of the State Board of Health for the fiscal year ending June 30, 1889.* Lansing, 1890.

NEW HAMPSHIRE. *Tenth Annual Report relating to the Registration and Returns of Births, Marriages, Divorces, and Deaths, for the year 1889.* Manchester, 1891.

NEW JERSEY. *Thirteenth Annual Report of the Board of Health, and Report of the Bureau of Vital Statistics.* Camden, 1889.

NEW YORK. *Eleventh Annual Report of the State Board of Health.* Volumes I, II. Albany, 1891.

NORTH CAROLINA. *Third Biennial Report of the Board of Health for the years 1889 and 1890.* Raleigh, 1891.

ONTARIO. *Report relating to the Registration of Births, Marriages, and Deaths for the year ending December 31, 1889.* Toronto, 1890.

ONTARIO. *Ninth Annual Report of the Provincial Board of Health for the year 1890.* Toronto, 1891.

WISCONSIN. *Thirteenth Report of the State Board of Health, 1889-90.* Madison, 1891.

NEW YORK CITY. *Annual Report of the Board of Health of the Health Department for the year ending December 31, 1890.* New York, 1891.

BIRTHS.

It is satisfactory to note that the registration of births in the states is improving each year. Not only are the records more accurate in the reports under consideration, but also more complete tables and summaries make them easier to handle.

In CONNECTICUT the total number of births, as recorded for the year 1890 was 17,176, which gives a rate of 24.35 per 1000, or one to every 42.7 of the population. There were 189 illegitimate and 335 twin births. A table representing the birth and death rate for 40 years if relied upon would show that the birth rate does not increase in proportion to the death rate, *i. e.*, the excess of births over deaths is slightly diminishing. The maximum number of births each year was in summer and autumn. The age of parents is not given, otherwise the statistics of births leave but little to wish for.

In INDIANA the total number of births reported for the year 1890 is 34,626. Of these 17,491 are males and 15,563 are females. The sex of the remainder is not reported. This is by no means a complete registration, for on the basis of the population of 2,192,404 it would give a birth rate of but 16 to the 1000. There were 848 still births, and 371 twin births. 667 births were illegitimate, an excessive number as compared with Connecticut.

In KANSAS there is some attempt to give the returns of births, marriages, and deaths, but each county is taken up in detail separately, and nowhere are statistics tabulated and rates computed. The number of births reported by 65 counties out of the 76 was 6325 during the year 1889. This is 1653 less than the number reported in 1888, and the rate per 1000 is but 4.6.

The report of MASSACHUSETTS for 1890 contains a summary of births, marriages, and deaths for the year 1889. There are no tables of vital statistics, these being given in the *Registration Report*.*

The births and marriages in MICHIGAN for the year 1888 were noticed in the *Publications* for March, 1891, in a review of the *Registration Report*. The health report for 1889 contains nothing but death statistics.

The report of the Board of Health of NEW HAMPSHIRE for the year 1889 is larger and more exhaustive than any hitherto published. The registrar states that the returns of births are not yet all that they

* See *Publications* for March, 1891.

should be, owing to the incomplete system of registration, but that the returns of marriages, deaths, and divorces are as accurate as can be obtained under any system of registration. The birth rate for 1889 was 18.3 per 1000. A table on page 202 represents the birth, marriage, and death rates in New Hampshire for the preceding six years. From this it appears that the birth rate increases regularly up to the year 1889, with the exception of 1888. A table on page 203 shows that New Hampshire has a lower birth rate than has any of the twenty countries compared. This is probably due, however, to inaccurate registration, which the registrar attributes to the neglect on the part of those whose duty it is to report births, and the indifference of local registrars. It is therefore suggested that a system of compulsory birth registration be established. In 1888, of all births 53.08 per cent were of American parentage, and 29.61 per cent of all births were of foreign parentage. There has been a gradual increase in the rate of births of foreign-born parents, while the disproportionate percentage increase of births of American parentage shows the fecundity of foreign residents to be greater than that of Americans.

The NEW JERSEY report gives no statistics of births except the total, which for the year 1889 was 29,099. It is unfortunate that rates are not given, so that the yearly collections of vital facts may be compared. Mere aggregates are insufficient for this purpose unless the population is also given. Assuming that the population was about 1,350,000 in 1889, it would give a birth rate of 21 per 1000.

A portion of the vital statistics of the report of NEW YORK CITY is prepared in a very accurate and elaborate manner. The registration of births is by no means complete, but it is shown that the number registered for the last six years has more than kept pace with the increase of population. The number of births and marriages recorded is supposed to be about one-fourth of the real number. The registrar accordingly considers the data as insufficient to compute tables.

The report of the State Board of Health of NEW YORK gives nothing but mortality statistics, and this is true also of NORTH CAROLINA.

The report of the Board of Health of the Province of ONTARIO is well planned; the tables are clear and well summarized, while diagrams and curves represent statistical facts more clearly than figures can. It would be more convenient perhaps if the rates per 1000 were given for a number of years in one table. The tables of birth statistics neglect to give the nativity and age of parents. The total

number of births registered in 1889 was 48,538, an increase of 1585 over 1888. This gives a rate of 22.6. Male births outnumber the female in a proportion of 103.5 to 100. The greatest number of births occurred in April; the smallest in February. There were 266 twin births, a slight increase over the preceding year. Two per cent of the births registered, or 971, were illegitimate, an increase of .2 per cent over 1888.

MARRIAGE AND DIVORCE.

Marriage records, as a rule, are not so well presented as other statistical facts, while divorce statistics are given in very few reports.

In CONNECTICUT the marriage rate for the year 1889 was 7.82 per 1000. Divorces have increased since registration began in 1861 from one divorce in every 13 marriages to one in every 10. Marriage statistics are quite complete, rates, age, and nativity being given.

In INDIANA the total number of marriages reported for 1890 was 18,646, or 206 less than in 1889. In these marriages 1189 grooms and 818 brides were foreign born. No marriage rates are given, but with a population as given above the marriage rate is 8.5 per 1000.

In KANSAS the registration is not complete enough to note details.

In NEW HAMPSHIRE the marriage rate for 1889 was 19.36 per 1000, greater than it has ever been before, and exceeded only by the rates of Hungary and Massachusetts, according to the table given. In 66.65 per cent of all marriages recorded for eight years both parties were American born. 14.07 per cent were foreign born. In 5.06 per cent, the husband was foreign born, and in 5.99 per cent the wife was foreign born. It also seems that the marriage rate for foreign-born parties increases more rapidly than that for American born. Divorces have decreased somewhat since 1888, but the number for 1889 is still greater than for any previous year since divorce records have been kept. They have increased regularly since 1870, and the ratio of increase is much greater than the ratio of increase of population of the state. Table XV on page 223 gives the records by counties for each year since 1870. The average for eight years is one divorce to every 10.25 marriages. The civil state of contracting parties is not given.

In NEW YORK CITY there were 14,992 marriages filed in 1889, an increase of 592 since 1888, and a rate (found by calculation) of 10.1 per 1000.

In the PROVINCE OF ONTARIO the number of marriages registered during the year 1889 was 14,880, or 6.9 per 1000. This is .2 per 1000 above the rate for 1888. One in every three persons married was a Methodist; one in every five a Presbyterian; one in every six an Episcopalian; and one in every seven a Catholic. The most popular months for marrying were December, October, and January. Twelve per cent of all marriages occurred in December, and only six per cent in August. The average age of marrying for males is slightly increasing while the average age for females remains about the same.

DEATHS.

Mortality statistics receive more attention than do other vital facts, and most all of the reports give satisfactory returns. The KANSAS and the NORTH CAROLINA reports, however, give nothing but aggregates, while the other reports give more or less detailed returns.

In CONNECTICUT the total number of deaths for 1889 was 15,529, or 17 per 1000. The death rate for ten years, by ages, is given on page 140, from which it appears that the death rate for children under 5 years of age has decreased from the percentage 32.3 in 1884 to 28.5 in 1889. The rate for persons between 5 and 20 years of age remains about the same for the whole period; but for the period between 20 and 60 years, the producing age, the rate increases from 29.6 in 1880 to 32.2 in 1889. An instructive table on page 183 gives the percentages of different orders of disease by years from 1878 to 1889.

The superintendent of the bureau of vital statistics of INDIANA estimates the death rate as between 16 and 18 per 1000, but the rate computed from the number of deaths returned is only 7.1 per 1000. The returns from cities in which burial permits are required by law give rates varying from 7.4 to 18 per 1000. The records are arranged in convenient tables, however, and valuable facts can be gathered from them. The total number of deaths reported from all causes, including still births, is 15,707, which is obviously too low when compared with the number of births reported and the average rates of other countries and states.

In KANSAS there were 3165 deaths reported in 1889, or 1229 less than in 1888. This record would give the ridiculously low rate of 2.3 per 1000, which shows the laxity with which even mortality statistics are collected.

In MASSACHUSETTS the death rate for 1889 was 21.38 per 1000,

and the increase from the rate 19.21 in 1889 is attributed to the epidemic of influenza. The effects of influenza were felt chiefly in consumption in the first three weeks of January, when the number of deaths was double the average of weekly mortality for the year. In 1889 there was a variation of only 7 between the maximum and minimum weekly average, while in 1890 the variation rose to 99. The death rate per 1000 of the population for different diseases is worked out in percentages.

Another interesting table shows the death rates for the large towns of Massachusetts. The rate for Boston is a little greater than the rate for the state (22.58).

The statistical work of the MICHIGAN report for 1889 is confined entirely to the presentation of mortality statistics from all diseases taken from the weekly mortality reports. Meteorological tables also show the relation between climatic conditions and the death rates for several years. Many diagrams are given, but the value of a number of them is impaired because of overcrowding. The Michigan Board of Health has undertaken to find the relations of diseases to atmospheric temperature, pressure, and humidity. The secretary states that the Board has accomplished the important work of "learning the time of greatest prevalence of each of the preventable diseases." On page 86 is given a table of 28 diseases, and the frequency of their occurrence per month for the year 1888, and also the average monthly occurrence for eleven years.

IN NEW HAMPSHIRE the death rate for 1889 is 17.91 per 1000, which is about the same as it has been for the last six years. This rate is lower than in any other country where vital statistics are collected in a careful manner, except Norway and Sweden. One new feature in the report is a summary embracing a review of some of the most prominent causes of death that have been registered during the last six years, 1884-89. The mortality is greatest (average for six years) for the quarter ending with September; the average rates for the four quarters are 24.74, 24.21, 26.97, and 24.08, respectively. Deaths were distributed according to the following ages for the seven years 1883-89:—

Age.	Percentage of Total Deaths.	Age.	Percentage of Total Deaths.
0-1	17.07	30-40	6.39
1-5	7.48	40-50	6.20
5-10	2.41	50-60	8.03
10-20	4.94	Over 60	38.79
20-30	7.47	Unknown	1.51

There has been an increase in zymotic diseases since 1884, a decrease in constitutional diseases, while the other causes of death remain about the same. The rate for typhoid fever increases slightly each year, and the tables show that it is especially fatal between the ages of 5 and 10 years.

The laws of NEW JERSEY require the registration of all deaths, and there is no reason why the report should not be complete as far as the mortality is concerned. In 1889 there were 26,543 deaths. These were distributed as follows:—

6842 under 1 year of age.	8068 between 20 and 60 years of age.
3512 between 1 and 5 years of age.	5586 over . . . 60 " " "
2395 " 5 " 20 " " "	1817 still births.

A table on page 420 gives the death rate per 1000 for cities over 20,000 population, with the age of greatest mortality and the chief causes of death. The death rate for the year is given as 22.04 per 1000.

In NEW YORK CITY the death records are probably exact, for laws prevent the removal of dead bodies without a certificate from the health department. The death rate for the year 1890 was 24.58 per 1000 as against 25.06 for the preceding year, and 19.65 for the state. In the second week in January the number of deaths from influenza rose to 1424, the highest number per week since 1865, with the exception of one week in July of 1872. The effect of the epidemic is shown by an increased mortality from bronchitis, pneumonia, and phthisis. It fell most heavily on adults, and the death rate of persons over 25 years of age was increased by about 30 per cent. There were 239 deaths from suicide; of these 81 were of German nativity, 71 of American, and 22 of Irish.

The tables in the NEW YORK STATE report are made up from the monthly mortality bulletins, many of which were not complete at the time of publication of this report; but the returns of the local boards of health are said to be the most complete of any year since the State Board of Health was established. The mortality for the state during 1890 was 110,523, or 19.65 per 1000. A table on page 62 shows the percentage of deaths under 5 years of age for six years; also the zymotic deaths per 1000 deaths from all causes, and the death rate for consumption. The percentage of deaths under 5 years of age was 37.2 in 1885, 38.0 in 1886, and from this time it has decreased to 33.52. The average for 6 years is 36.7. In 1885 there were 222.17

deaths from zymotic diseases out of 1000 deaths from all causes. The highest rate was 227.80 per 1000 in 1887, since when deaths from these diseases have fallen to 159.68 per 1000, a great decrease from the average for six years, 206.53. In consumption there has also been a decrease from 139.78 per 1000 in 1885 to 122.0 in 1890, although the rate in 1888 was down as low as 120. The average for the six years is 125.45.

An interesting table on pages 654-656 shows the mortality by months for periods of six years. Autumn has the least mortality, but diphtheria and typhoid fever are more prevalent at this time. During the first four months of 1890 there were 5000 deaths more than the average for that time; this being attributed to the influenza epidemic. The mortality for the following diseases was greater for 1890 and 1889 than for any of the five years preceding them: consumption, acute respiratory diseases, diseases of the nervous system, and deaths from cancer. The report gives nothing but mortality statistics, and in these there is no division into sexes, ages, or races. The rate for children under five is given.

The secretary of the NORTH CAROLINA Board of Health deplors his inability to get, under existing laws, accurate vital statistics. Fourteen towns sent in reports, and of these only six have records covering the entire year; the rest have omissions of from one to three months. From very inadequate data the secretary computes the death rate as 15.1 per 1000. It is also argued that the death rate was not influenced by *la grippe*.

The deaths in the PROVINCE OF ONTARIO in 1889 numbered 23,329, or 10.7 per 1000, as against 11.0 in 1888. It is probable that the registration of deaths is not so accurate as it should be, for the rate in the cities was 18.2, and in the towns 13.8. 109.9 males died to every 100 females. The most prominent causes of death were consumption, pneumonia, nervous diseases, heart disease, and diarrhœal diseases. On page 86 is given a table showing the age of mortality for different occupations, from which we get the following:—

	Average Age 1889.	Average Age 1888.
Cultivators of soil,	61.3 years.	61.8 years.
Mechanics,	52.0 "	53.6 "
Business men	49.0 "	50.2 "
Professional men,	50.8 "	50.8 "
Miscellaneous,	63.1 "	62.6 "
Females at work,	34.1 "	42.5 "

MISCELLANEOUS.

The Connecticut Registration Report contains, besides vital statistics, a complete meteorological report by months from 1873 to 1889.

The Indiana report contains registration records which are far from complete. The secretary frankly admits this, and states that it is due to the manner in which county health officers are chosen, viz., by competitive bids, i. e., the lowest and best bidder is selected in most cases regardless of ability. The report is very good so far as it goes, and it is hoped that Indiana will soon have laws by which the statistics of registration may be improved.

The Massachusetts report contains a valuable paper on the *Growth of Children*, by H. P. Bowditch, M.D., studied by Galton's method of percentile grades. Tables show the heights and weights of Boston school children of both sexes, and of various ages, and separate tables give the heights and weights of children according to nativity.

The Kansas report contains an interesting article by Prof. Frank W. Blackmar on *The Money Value of a Low Death Rate*.

There are no statistics of value in the Wisconsin report. The secretary states that tables were prepared showing the prevalency of the more common forms of preventable disease, but that lack of space prevented their insertion. There is no legislation at all in Wisconsin to compel registration of births, marriages, and deaths.

From the above reports calculations have been made with the following results:—

	Birth Rate per 1000.	Marriage Rate per 1000.	Death Rate per 1000.
Connecticut ¹	24.35	7.82	17.00
Indiana ²	16.00	8.50	17.00
Massachusetts ¹	26.24	9.38	21.38
Michigan ³	26.50	9.30	.....
New Hampshire ³	18.20	9.18	17.91
New Jersey ³	21.00	11.12	22.04
New York ³.....	.....	.....	19.65
Ontario ¹	22.64	6.90	15.10

¹ 1890. ² 1891. ³ 1889.

The inadequacy of the returns in most of the states is so manifest that further criticism is unnecessary.

GARY N. CALKINS.

STATISTICS OF PAUPERISM IN HARTFORD.

Report of the Special Committee on Out-door Alms of the Town of Hartford, 1891. Hartford. The Case, Lockwood & Brainard Company. 1891. Pp. lxxi, 93.

This report, with its trailing appendices and elaborate tables, is the result of a modest resolution calling for the appointment of a committee to confer with the selectmen in the matter of out-door alms. The committee explains that "in order to confer it was necessary that an opinion should have been formed. In order to form an opinion an examination into the facts of the case seemed necessary, and a cursory examination soon lead to the discovery that all the parts of the system of alms administration are so bound together that the examination of one part carries with it an examination of the whole."

The statistical portion of the report may be divided into two parts, first, that which gives a comparative view of the poor relief of various places and countries, and, second, that which sets forth the facts regarding the history and present extent of poor relief in the town of Hartford. The statistics of both sorts have been collected and arranged with a view to popular effect,—that is, with a view to the securing of certain definite reforms in the administration of poor relief in Hartford. And while this animus does not seem to have lead to any conscious concealment or misrepresentation of facts, it gives to the report something of the character of special pleading.

The tables giving a comparative view of the gross and *per capita* cost of poor relief in various places are planned to lead up to the conclusion that Hartford leads the old world as well as the new in the weight of the *per capita* burden imposed upon her by such relief. The facts to prove this are gathered from various secondary sources, such as H. C. White's "*Report to the Executive Committee of the Taxpayer's Association*, New Haven, 1886," *The Statesman's Year-Book*, *Annuario Statistico Italiano*, and Böhmert's *Armenwesen in 77 deutschen Städten*. The subject is a most complicated one, and the belief of the committee that the difference in *per capita* cost between Hartford and other American cities is so wide "that no theory of errors can possibly close it up" may be questioned. Within a single state comparisons between various communities can be made with a certain amount of accuracy, but even here one is apt to conclude that the place with which he is best acquainted expends the most for relief

work, because he knows all the items for that place, and is apt to be ignorant of some that should be included in the relief work of places at a distance. But between cities located in different states comparison is doubly difficult. The amount of the burden assumed by the state as a whole is a prime factor in comparing the burdens borne by the local political units. In some states all the pauper insane, blind, deaf and dumb, and feeble minded, and all dependent children, are provided for by the state at large. In others, all these classes are provided for by the counties, towns, or cities. One has only to glance at the Census Bulletin, which gives the classified expenditures of one hundred cities, in order to see that the amount said to be expended on charities depends not so much on the absolute burden of pauperism in the given community as upon the laws which regulate the relations of the city to the state and county in such matters. I have in mind a western city, about the size of Hartford, that spends next to nothing for charity, but it is because nearly all burdens of this character are imposed upon the county or the state at large.

When we come to comparing cities located in different countries, the quicksands are still deeper. Table II compares Hartford with fourteen cities and one "union" in various countries. Table III compares Hartford with twenty-four Italian communities, and Table IV compares Hartford with seventeen countries in Europe. The last mentioned table contains what I cannot but think a gross blunder, and its correction would negative an important assertion made on page viii of the report. The assertion is this: "In the British Isles, with a population of over 38,000,000, they spend \$1.07 [*per capita*] on an average (gross) on poor relief, while we spend \$1.96." Turning to Table IV, on which this statement is based, we find that the population of the three countries comprising the British Isles — England, including Wales, Ireland, and Scotland — amounts to 37,440,505; and the gross amount spent by the same countries for all forms of poor relief is \$112,406,630. This gives a *per capita* cost of \$3 02, which is 54 per cent greater than that for Hartford. The erroneous *per capita* for the British Isles, \$1.07, was obviously obtained by dividing the outlay for poor relief of the three countries, \$112,406,630, by the population of the whole seventeen countries included in the table, that is, by 104,957,034. The sweeping statement, therefore, that Hartford leads the old world as well as the new in the matter of poor relief cannot be correctly based even on the tables presented.

In the part of the report relating simply to local conditions the committee worked from original sources, and the results are of more value and must have contributed much more to the enlightenment of the selectmen. In thoroughness and in apparent fairness this part of the report is in every way admirable. The state chemist was asked to pass upon a list of articles that the poor had bought with grocery orders given by the selectmen, and gave it as his opinion that only about one-third of the total amount, \$732.54, had been expended for "articles of necessary support." The committee investigated 353 cases receiving out-door relief on January 1, 1891, and concluded that of this number 51 per cent needed no aid, 24 per cent should have been sent to the almshouse, and only 25 per cent were proper subjects for the sort of relief they were receiving. An interesting study was made of the inhabitants of the workhouse and the almshouse. Out of 149 males only 4 were believed to be temperate, and out of 80 females only 5 were believed to be temperate. The tables compiled from the police court records, especially those relating to arrests and commitments, are of decided value.

Altogether it is much to be wished that every town meeting and every board of county commissioners might be served by a committee as intelligent and as thorough as this one.

A. G. WARNER.

COMPARISON OF MOVEMENT OF POPULATION IN PRUSSIA AND FRANCE.

The following is based upon material published in the *Zeitschrift des Königes Preussischen Statistischen Bureaus*. 1891. Nos. 1-2.

A comparison of the increase of population in France and Prussia is important in view of the unfriendly relations now existing between these two countries. The increase of births over deaths in France in 1889 was 85,962, and in Prussia 411,785, or nearly five times as great. In comparing these figures it must be remembered that France has a population of 38 millions while that of Prussia is only 29 millions. The population of France in 1889 increased 2.3 per 1000, and in Prussia 14.2 per 1000. The birth rate per thousand is 23.2 in France, and 37.7 in Prussia.

TABLE I. BIRTHS.

France.				Prussia.		
Year.	Total.	Illegitimate.	Per cent.	Total.	Illegitimate.	Per cent.
1880	920,177	68,227	7.41	1,028,577	80,358	7.81
1881	937,067	70,079	7.48	1,012,564	78,039	7.71
1882	935,566	71,305	7.62	1,035,567	82,767	7.99
1883	937,944	74,213	7.91	1,028,514	82,074	7.96
1884	937,758	75,754	8.08	1,060,850	85,967	8.18
1885	924,558	74,171	8.02	1,064,401	86,295	8.11
1886	912,838	74,806	8.19	1,074,298	87,117	8.11
1887	899,333	73,854	8.21	1,084,995	87,988	8.11
1888	882,639	74,919	8.49	1,091,218	85,994	7.86
1889	880,579	73,571	8.35	1,094,504	85,962	7.85

TABLE II.

Deaths.			Increase of Births over Deaths.	
Year.	France.	Prussia.	France.	Prussia.
1880	856,237	692,610	61,940	335,967
1881	828,828	682,139	108,229	330,425
1882	838,539	700,061	97,027	335,476
1883	841,141	711,169	96,803	317,348
1884	858,784	718,049	78,974	332,801
1885	836,897	716,859	87,661	347,542
1886	860,222	742,733	52,616	331,565
1887	842,797	686,170	56,536	396,825
1888	837,867	665,429	44,772	425,789
1889	794,933	682,719	85,646	411,785

The larger increase in France in 1881 is due to the greater number of births in that year.

The average percentage of illegitimacy for the ten years was 7.97 for both countries, but in France there is no distinction made between legitimate and illegitimate still-born children.

TABLE III.

France.			Prussia.	
Year.	Marriages.	Divorces.	Marriages.	Divorces.
1880	279,046	.....	208,456	907
1881	282,079	.....	209,586	2,329
1882	281,060	.....	217,239	2,306
1883	284,519	.....	220,748	3,577
1884	289,555	1,657	225,939	3,856
1885	283,170	4,277	230,707	3,902
1886	283,208	2,950	231,588	3,808
1887	277,060	3,636	229,999	3,999
1888	276,848	4,708	233,421	4,251
1889	272,834	4,786	240,996	3,994

The divorces for 1884 in France are for the last four months of the year, and the increase in this and the succeeding year is due to the passage of new divorce laws. The returns for the year 1880 in Prussia are incomplete.

In Prussia there has been a steady increase in the number of marriages, and in France a slight decrease. Out of 1000 inhabitants, 7 marry in France and 8 in Prussia. By the increase of births over deaths during the ten years, 1880-89, Prussia has gained nearly 2,800,000 in population over France. This threatened depopulation of their country has alarmed the French, and as a remedy it has been proposed to exempt from taxation the heads of families having a certain number of children.

F. C. NORTON.

SUICIDES IN PRUSSIA AND ITALY.

The following paragraphs are taken from the *Zeitschrift des Kön. Preus. Stat. Bureau*, 1891, Nos. 1-2.

Although the year 1888 had shown the smallest number of suicides in Prussia since 1883, an increase again took place in 1889. This, however, is so slight that the year 1889 is still behind the years 1883-87 in this respect. The following table shows the number.

According to this there are annually nearly four times as many males as females who commit suicide; moreover, the decrease in the inclination of the population to commit suicide is much more noticeable among the males than among the females.

SUICIDES IN PRUSSIA.

Year.	Males.	Females.	Total.	Out of every 100,000 Living.		
				Males.	Females.	Total.
1883	4,933	1,238	6,171	36	9	22
1884	4,691	1,209	5,900	34	8	21
1885	4,811	1,217	6,028	34	8	21
1886	5,047	1,165	6,212	36	8	22
1887	4,703	1,195	5,898	33	8	21
1888	4,255	1,138	5,393	30	8	19
1889	4,430	1,185	5,615	31	8	19

In Prussia, in spite of the great obstacles which are opposed to the inquiry as to the motives for suicide, only a comparatively small number remain unknown. In the year 1889 this was the case in only 18.6 per cent of all suicides,—about the same proportion as in the previous years.

The causes of suicides in Prussia were as follows:—

	1883.	1884.	1885.	1886.	1887.	1888.	1889.
Insanity.....	1,505	1,464	1,582	1,671	1,559	1,468	1,429
Weariness of life.....	655	661	611	607	592	443	537
Bodily ailments.....	446	469	477	504	519	508	564
Passion.....	175	173	168	182	193	177	182
Crime.....	638	582	650	665	606	462	474
Grief.....	29	18	23	29	32	19	31
Trouble.....	814	770	766	733	646	662	643
Repentance, shame....	489	465	435	501	455	487	500
Anger and quarrels.....	208	148	145	146	181	136	151
Other causes.....	56	48	62	71	29	37	61
Unknown causes.....	1,156	1,122	1,100	1,103	1,086	994	1,043

Thus, about a quarter of all suicides are undoubtedly caused by insanity, while the greater part of the remainder are also due to causes which work more or less on the mind, such as weariness of life, crime, trouble, repentance, shame, etc. But if the two sexes are separated, important distinctions are brought out, as the following table will show. In every 100 persons who committed suicide the distribution between the sexes was as follows:—

Cause.	1885.		1887.		1889.	
	Males.	Females.	Males.	Females.	Males.	Females.
Insanity.....	21.9	43.3	22.7	41.1	21.9	38.6
Weariness of life...	10.4	9.0	10.8	7.0	10.0	7.8
Bodily ailments....	7.8	8.4	8.7	9.1	9.6	11.6
Passion.....	2.3	4.9	2.5	6.5	2.5	6.2
Crime.....	12.9	3.1	12.3	2.4	10.1	1.3
Grief.....	0.4	0.4	0.5	0.8	0.5	0.9
Trouble.....	13.8	8.3	11.6	8.5	12.7	6.8
Repentance, shame	7.3	6.8	7.7	7.9	9.0	8.7
Anger and quarrels	2.6	1.7	2.9	3.5	2.8	2.3

Insanity, therefore, as a cause of suicide occurs much more frequently among females than among males; while among the latter weariness of life, crime, and trouble are more frequently the motives for self-destruction than among females; and even on account of bodily ailments, passions, and grief, females voluntarily end their lives in greater numbers than males.

In ITALY special attention has been given for a long time to the suicides of young persons, although the subject of the suicides of students has not been investigated so thoroughly as in Prussia since 1883.

Italian statistics distinguish two age classes of youthful suicides, namely, those under 15 years of age, and those from 15 to 20. According to official documents, the total number of the former amounted, in the years 1870-79, to 51, of whom 41 were males and 10 females. The total number of those from 15 to 20, in the same time, was 501, of whom 350 were males, and 145 females.

Since 1880 the suicides of young persons in the Italian Kingdom have been as follows:—

	Under 15 Years.			15-20 Years.		
	Males.	Females.	Total.	Males.	Females.	Total.
1880	3	...	3	28	21	49
1881	7	...	7	61	21	82
1882	3	4	7	56	19	75
1883	3	...	3	67	30	97
1884	4	1	5	63	18	81
1885	4	...	4	57	30	87
1886	6	1	7	59	22	81
1887	2	4	6	64	29	93
1888	1	2	3	64	27	91
Total.	33	12	45	519	217	736

Thus, in the suicides under 15 years of age, the yearly average sank from 5.1 in the 10 years 1870-79 to 5.0 in the nine years 1880-88. On the other hand, the yearly average of suicides of those 15-20 years old, in which the school-examination question played a great part, rose from 50.1 cases in the first ten years to 81.8 in the last period.

F. C. HOLMES.

ANTHROPOMETRIC STATISTICS.

Thirtieth Annual Report of the Professor of Hygiene and Physical Education of Amherst College. 1891. Pp. 20. Map.

In 1861 Amherst College made physical exercise a compulsory part of the course. Since that time funds amounting to \$177,581 have been bestowed on this department, which has thus been enabled to secure a fine gymnasium, an athletic field, and the best instruction. It has also paid special attention to anthropometric statistics, as is shown in several tables appended to this report. These tables give (1) average measurements of about 2000 students; (2) mean measurements of 2086 students; (3) average measurements of those students who were 21 years of age; (4) measurements of 2230 students grouped together by the percentile methods proposed by Mr. Galton, of London. In table (4) each measurement is obtained by using the data of the man who stands exactly midway in the list,—leaving 50 per cent of the men above and 50 per cent below him. The following extracts

	Averages of 2000 Measures.	Mean Measures of 2086 Students.	Average of Stu- dents 21 Years Old.	50 per Cent of 2230 Measurements.	Per Cent of In- crease in Class of '91.
Height.....	1725	1720	1728	1724	0.6
“ Sternum.....	1410	1410	1407	1410	0.7
Girth, head.....	572	570	572	569	0.5
“ chest, full.....	927	925	933	925	1.0
“ right knee.....	361	360	359	359	0.8
“ left calf.....	349	350	348	345	2.3
“ upper right arm contracted..	295	295	301	295	6.4
Breadth of shoulders.....	430	430	431	433	3.6
Strength of legs.....	166	175	172	169	26.0

from these tables will show the remarkable correspondence between their results. Metric units are used. The percentage increase in class of 1891 is also given.

Statistics of the class of 1891 show that in more than two-thirds of the linear and outline measurements of their bodies growth during four years has been proportional to height.

The following are a few of the facts deduced from comparison of the data collected at different times: the average actual strength of students for years 1887-91 is 8.5 per cent greater than for years 1861-88; the average loss of time on account of sickness was 8 per cent less from 1885-89 than from 1861-65; the deaths, 1861-70 (exclusive of those who fell in the war), were 6.1 per cent of whole number graduated; the deaths, 1881-90, were 3.4 per cent of whole number graduated.

Statistiques de la Suisse, Resultats de la visite Sanitaire des Recrues en Automne, 1889. Berne, 1891. Pp. 49.

The twelve tables contained in this report give a good idea of the physical condition of men in Switzerland. They show the general conditions of aptitude, causes of incapacity, bodily dimensions, acuteness of vision, and visual defects of all men examined for the army. Absolute numbers are given under each head by districts and cantons, and also by professions. The relation of stature to other bodily dimensions is carefully noted.

Of 29,519 men examined in 1889, 23,010 were born in 1870, and 6509 before 1870. Of every 1000 men examined 503 were accepted and 289 entirely exempted from service. In the other 208 cases decision was postponed for one or two years. 5769 men, who enlisted at some previous time, were reexamined. 28.4 per cent were retained, 14.2 per cent furloughed, and 57.4 per cent entirely exempted from further service.

Percentage results of corresponding investigations for 1884-89 are appended for comparison.

R. WATERMAN, JR.

THE CENSUS OF AUSTRIA.

The Austrian census was taken December 31, 1890, and many of the results of the inquiry in regard to the composition of the population are published in the August-September number of the *Statistische Monatschrift*, published by the K. K. Statistischen Central Commission, Vienna. It is to be observed that the returns relate to Austria alone.

The population of Austria is enumerated at 23,895,413, an increase of 7.91 per cent since 1880. Between 1869 and 1880 the increase had been 8.60 per cent.

According to sex the population is divided as follows:—

	1890.	Increase since 1880.
Males, . . .	11,680,129	8.04 per cent.
Females, . . .	12,206,284	7.79 “

A calculation shows that to every 1000 males there were in 1869 1060; in 1880, 1047; and in 1890, 1044 females. The distribution by age groups is seen in the following table, on the basis of a million:—

Age Periods.	Male.	Female.	Age Periods.	Male.	Female.
0-5	131,541	126,971	55-60	35,236	37,054
5-10	112,938	107,861	60-65	28,330	31,857
10-15	104,331	101,217	65-70	21,057	22,775
15-20	95,571	95,290	70-75	14,788	15,658
20-25	85,593	85,029	75-80	7,263	7,612
25-30	76,186	76,061	80-85	2,770	3,037
30-35	70,887	71,232	85-90	790	906
35-40	60,039	60,067	90-95	136	176
40-45	56,051	57,030	95-100	20	32
45-50	51,316	52,111	100+	6	7
50-55	45,151	48,017			
				1,000,000	1,000,000

The next table shows the changes which have taken place since 1869 in age distribution:—

Age Periods.	Male.			Female.		
	1869.	1880.	1890.	1869.	1880.	1890.
0-10	246.45	245.64	244.48	235.74	235.54	234.84
10-20	197.20	195.11	199.93	190.67	191.33	196.51
20-30	153.05	161.91	161.78	168.83	162.22	161.09
30-40	137.45	133.13	130.92	140.35	135.00	131.30
40-50	112.32	109.07	107.36	115.88	112.18	109.22
50-60	85.43	79.91	80.38	83.42	86.00	85.07
60-70	48.54	52.65	49.39	46.84	53.71	54.63
70-80	16.75	19.24	22.05	15.42	19.46	23.19
80-90	2.61	3.17	3.56	2.59	3.83	3.94
90-100	0.19	0.16	0.15	0.23	0.22	0.21
100+	0.01	0.01	0.00	0.01	0.01	0.00
	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

A further summary groups the population into productive and non-productive ages.

Age Class.	Male.			Female.		
	1869.	1880.	1890.	1869.	1880.	1890.
0-15	350.32	346.37	348.81	332.79	333.83	336.05
15-65	608.98	609.98	604.36	628.70	622.20	613.83
65+	40.70	43.65	46.83	38.51	43.97	50.12
	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

The civil condition was as follows, in percentages:—

	Single.	Married.	Widowed.	Divorced and Separated.
1869	60.12	34.52	5.33	0.03
1880	59.60	34.83	5.56	0.05
1890	60.75	33.57	5.60	0.08

The legally divorced were first taken in 1890 and have been reckoned with the separated, so that these results are not comparable with those of 1869 and 1880.

And by sex this is shown as follows in proportions of 1000:—

Condition.	Male.			Female.		
	1869.	1880.	1890.	1869.	1880.	1890.
Single.....	616.11	615.13	628.28	587.10	577.14	587.64
Married.....	354.15	356.34	342.12	336.74	341.54	329.52
Widowed.....	29.49	29.13	82.87	75.78	80.80	81.96
Divorced and Separated..	0.25	0.40	0.73	0.38	0.52	0.89
	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

The next table shows the religious faith upon the basis of each one thousand inhabitants.

	1869.	1880.	1890.
Roman Catholic....	803.70	799.02	792.38
Greek United.....	115.27	114.40	117.73
Armenian United.....	0.15	0.13	0.11
Old Catholic.....	.....	.....	0.35
Greek Oriental.....	22.66	22.22	22.80
Armenian Oriental.....	0.05	0.06	0.05
Evangelical (Augsburg)....	12.23	13.08	13.22
Evangelical (Helvetian).....	5.14	4.99	5.05
Herrnhuter ¹.....	.....	.....	0.02
Anglican.....	.....	.....	0.06
Mennonites ².....	.....	.....	0.02
Unitarian.....	0.01	.....	0.01
Lippowaner ³.....	.....	.....	0.14
Israelite.....	40.57	45.40	47.85
Mohammedan.....	.....	.....	0.00
Other Faith.....	0.22	0.55	0.03
Without Faith.....	.....	0.15	0.18

¹ Herrnhuter,—a denomination of Moravians.

² Mennonites,—followers of Menno Simons, a kind of Quaker sect.

³ Lippowaner,—a Russian sect.

According to language the population is divided :—

Language.	1880.	1890.	Absolute.	Per Cent.
German.....	8,008,864	8,461,997	+453,133	+5.66
Moravian } Bohemian } Slovak }	5,180,908	5,473,578	+292,670	+5.65
Polish.....	3,238,534	3,726,827	+488,293	+15.08
Ruthenian.....	2,792,667	3,101,497	+308,830	+11.06
Slovenian.....	1,140,304	1,176,535	+36,231	+3.18
Servian } Croatian }	563,615	644,769	+81,154	+14.04
Italian } Latin }	668,653	674,701	+6,048	+0.90
Roumanian.....	190,799	209,026	+18,227	+9.55
Hungarian.....	9,887	8,139	—1,748	—17.68
Total.....	21,794,231	23,477,069	+1,682,838	+7.72

It will be observed that the Hungarian alone has positively diminished.

These changes are represented in proportions of 1000 inhabitants :

Language.	1880.	1890.	Language.	1880.	1890.
German	367.5	360.4	Servian }	25.9	27.5
Moravian }	237.7	233.2	Croatian }	30.7	28.7
Bohemian }			Italian }		
Slovak	148.6	158.7	Roumanian.....	8.8	8.9
Polish.....	128.0	132.1	Hungarian.....	0.5	0.4
Ruthenian.....	52.3	50.1			
Slovenian.....			Total.....	1000.0	1000.0

The Polish, Ruthenian, and Servian-Croatian have relatively increased the most, and it will be observed that they have the greatest increase in the preceding table.

The literacy of the population is shown as follows in every 100 over 6 years:—

	1880.		1890.	
	Male.	Female.	Male.	Female.
Read and write	61.91	55.13	68.48	62.57
Only Read.....	5.50	8.79	3.77	6.35
Neither.....	32.59	36.08	27.77	31.80

From this it appears that the divergence in literacy between the sexes has become less marked.

In relation to bodily and mental defects in every 10,000 there were:—

Defect.	1869.	1880.	1890.
Blind.....	5.6	9.1	8.1
Dumb.....	9.7	10.1	12.9
Idiots	....	20.5	21.7
Imbeciles } ...			
Cretons }			

In the distribution of blindness there is great regularity, but in mental defects a very wide range occurs in the various provinces. It is the highest in Salzburg, 66.2, and the lowest in Silesia, 9.0.

To every 1000 males the females numbered as follows :—

	Blind (both eyes).	Dumb.	Idiota, etc.
1880	892	817	886
1890	907	820	849

For every 1000 cretins, males, there were 771 cretins, females, and for every 1000 idiots and imbeciles, males, there were 885 idiots and imbeciles, females.

FRANCIS WALKER.

THE CENSUS OF BERLIN.

Einstweilige Ergebnisse der Volkszählung vom 1. December, 1890, in der Stadt Berlin. Veröffentlicht vom Statistischen Amt der Stadt. 1891. Pp. 64.

Berlin resembles an American city in at least two respects in its rapid increase in population, and in the possession of considerable suburbs, large, at any rate, for a continental city. It has grown from a population of 1,122,330 in 1880 to one of 1,578,794 in 1890, while the corresponding figures for the suburbs situated within a German mile of the city are 123,113 and 268,792. In these ten years, therefore, Berlin and the suburbs together increased by more than 48 per cent, the gain in Berlin alone being 40 per cent. Out of every 1000 inhabitants of Berlin in 1880, 434 were born there; in 1890, 407. Furthermore, in 1890, of those more than 17 years of age, only 249 out of 1000 were natives of the city. There were 17,866 citizens of other countries temporarily in Berlin December 1, 1890; Austria-Hungary furnished 8215, Russia 2416, the United States 1462, Great Britain and Ireland 1173. Of the 39,172 children one year old or less, 2115 were in tenements of one room, 19,899 in those of two, and 11,017 in those of three rooms, making a total of 33,031, or 84 per cent, in tenements of not more than three rooms. Students of political science will be interested to note that the six Reichstag electoral districts of Berlin have 91,666, 324,788, 135,371, 395,101, 144,626, and 487,242 inhabitants, respectively. C.

A FRENCH LABOR BUREAU.

The stimulus imparted to the Statistics of Labor in this country by the establishment of the state and national bureaus has led to the creation of analogous departments in some of the European countries. The latest and perhaps the best equipped of all is *l'Office du Travail*, established in France by a decree of August 19, 1891. The main points of the decree are as follows:—

ART. 1. The object of the bureau of labor is to collect, coordinate, and publish, within the limits prescribed by the present decree, information relative to labor, especially concerning the condition and the development of production; the organization and the remuneration of labor; its relations to capital; the condition of working people; the comparative conditions of labor in France and abroad; and, furthermore, to execute any labors attaching to this range of subjects which may be submitted to it by the ministry of commerce, industry, and colonies.

ART. 2. The office shall be a distinct department immediately under the authority of the minister of commerce, industry, and colonies. The personnel of the bureau is to consist [Art. 3.] of a director, with a salary of 12,000 to 18,000 fr.; two chiefs of divisions, 6000 to 9000 fr.; two assistant chiefs of divisions, 3500 to 5500 fr.; one actuary, 4000 to 7000 fr.; two editors, or translators, 2200 to 4000 fr.; one librarian, 2200 to 4000 fr.; three clerks, 1880 to 3000 fr.; three substitute clerks, 1200 to 1600 fr.; and three permanent agents for field work, 4000 to 7000 fr.

ARTS. 4 to 6. The director of the bureau is appointed by the president on the nomination of the minister, while the other officials are appointed by the minister. Officials of other departments may be temporarily attached to the bureau with the consent of the ministry to which they belong, and, at the suggestion of the director, temporary agents may be appointed for special services.

ART. 7. The central bureau shall collect, by correspondence with public departments and officials, with individuals and organizations, or by investigations in French and other publications, the facts which may be useful to the office. It shall coordinate them with the information furnished by the field agents, and shall edit the whole either for publication or for report to the minister.

The correspondence of the bureau, with the Ministry of commerce, industry, and colonies, and with the other ministries and their organs, shall be conducted in the forms prescribed by the various ministries.

ART. 8. The temporary and permanent agents engaged in the external service of the bureau are to make their investigations directly at various places, to collect information, etc. They are under the immediate supervision of the director, and act at his order and under his instructions. Any investigations to be made, or facts to be collected, concerning the establishments or industries under the control or direction of the state, remain exclusively in the hands of the appropriate administration, unless the administration request the assistance of the bureau of labor.

ART. 9. The information collected and arranged by the bureau of labor shall form the basis of a periodical publication to be entitled *Bulletin de l'Office du Travail*. Separate publications on special questions may also be made.

In accordance with the above decree, of which the above are the main features, the president of the republic has appointed, by a decree bearing the same date, M. Lax, general inspector of roads and bridges, and formerly director of railroads in the ministry of public works, to be the first director of the bureau.

R. P. F.

BIBLIOGRAPHICAL NOTE ON STATISTICS OF IMMIGRATION.

Estimates of the number of immigrants arriving in the United States previous to 1820 are found in Seybert's *Statistical Annals*, and in the *Tenth Census*, vol. *Population*, 457. The immigration from Great Britain since 1815 is recorded in the *British Statistical Almanac*.

In 1817 returns were made by the customs-house officials in the ten principal ports, showing the number of passengers who had entered at those ports during the year. These returns are now on file.

Accurate statistical material has been collected since 1820, in compliance with the Passenger Act of March 2, 1819. This act required that a list of all passengers should be furnished the customs' collectors in each port, giving age, sex, occupation, country from which passengers came, and the place of intended residence. These state-

ments were all to be forwarded quarterly to the Secretary of State. Since 1868 these reports are bound with the *Commerce and Navigation Reports*. Before that date they were bound with the reports of the Department of State. These reports give the ages, in periods of 5 years, of all immigrants under 40, and then simply note those above 40 with sex, occupation and nativity. Previous to 1856 all passengers were enumerated, whether travellers or immigrants; between 1856-68 the statistics distinguished as to the total number of alien arrivals, the immigrants from transient passengers, and since 1868 the number of immigrants of each nationality is shown separately from the sojourners.

Another source of information for an investigation of this subject is found in the passenger abstracts transmitted to the Secretary of State, by the collector of customs, and on file in the Department, but which are not embraced in the annual reports on immigration.

A third source of information is found in such customs-house records as furnished immigration statistics, which have never been transmitted to the Department, or not kept on file.

The number of immigrants is first taken into account in the census returns in the year 1850. This census gives tables showing the number of foreign born in each state and county. The census of 1860 also notes the number of alien passengers arriving in the United States from 1819-60, with distinctions of age and sex. The nativities and intended residence of the immigrants is noted. A classification of their occupation is also attempted. Tables are given showing the annual increase of foreigners, their proportion to the total population, and also their greater number in the large cities. The census of 1870 gives the occupation of the foreign born in four classes: agricultural, professional and personal services, trade and transportation, manufacturing, mechanical and mining industries, and also adds an inquiry as to those having foreign parents. The census of 1880 records the nationality of the parents of the foreign born.

Statements showing the arrival of alien passengers and immigrants in the United States each year, from 1820 to 1888, inclusive, have been compiled, entirely from the official documents, by Bromwell, in *History of Immigration to the United States for the years 1820 to 1856*, and by the Chief of the Bureau of Statistics for the entire period. These, with the census returns since 1850, furnish the most valuable bibliographical references.

Statements are given showing —

I. The number of immigrants.

- a. 1820-54. Number of foreigners arriving each year. *Comp. Seventh Census*, 122.
- b. 1851-80. Number of foreigners arriving. *Tenth Census, Population*, 461-463.
- c. 1820-67. Number of alien passengers arriving by quarter years. *Arrivals of Immigrants, U. S.*, 34-74.
- d. Total number for each year found in official reports on immigration, bound with *Commerce and Navigation Reports* since 1868, and before that with reports of Department of State.

II. Age of Immigrants.

- a. 1820-67. Total number of alien passengers by age divisions: under 15 years; 15 to 40 years; 40 years and over.—*Arrivals of Immigrants, U. S.*, 74. 1868-72. Number of immigrants only; 1873-88. Ages and nationalities of Immigrants.—*Arrivals of Immigrants, U. S.*, 74.
- b. 1820-68. Total number of alien passengers by age periods of five years up to 40 years; and from 1868 total number of alien passengers is given by age periods: under 15 years; 15 years to 40 years; 40 years and over.—*Reports of Immigration*.
- c. 1820-55. Ages given in five-year groups.—Bromwell's *History of Immigration*.
- d. Age of foreign born by one-year periods.—*U. S. Census, 1880, Population*, 552.

III. Sex of Immigrants.

- a. 1820-90. Sex given by age periods.—*Reports on Immigration*.
- b. 1820-55. Sex of immigrants.—Bromwell's *History of Immigration*.
- c. Statement, by nationalities, of number and sex of alien passengers arriving in the United States from 1857 to 1867, and of immigrants only from 1868-88.—*Arrivals of Immigrants, U. S.*, 34.
- d. Sex of total foreign-born population, in 1880, by states.—*U. S. Census, Population*, 542.

IV. Nationality of Immigrants.

- a. Nationalities by continents and countries.—*Arrivals of Immigrants, U. S.*, 34-74.
- b. Nationality of immigrants.—*Immigration Reports*.
- c. Total number from each nation, by years, from 1820-55.—Bromwell's *History of Immigration*.

SUSAN CUSHMAN.

STATISTICS OF VACCINATION.

Neue Beiträge zur Frage des Impfschutzes. Zweite Beobachtungsreihe, 1887-88. Von Josef Körösi, Director des Budapester Communal-statistischen Bureaus. Berlin, 1891.

Josef Körösi has undoubtedly contributed more to the statistical study of vaccination than anyone now living. Many years ago a French artillery officer, Carnot, proposed in opposition to vaccination the theory that by preventing small-pox vaccination had increased other diseases. He even went so far as to say that it interfered with the birth rate, and that the depopulation of France was due to vaccination. John Simon made the significant comment upon this pseudo-theory that "*Post ergo propter* was never more whimsically illustrated. For the argument goes simply to claim as the *effect* of vaccination whatever evils have occurred since its recovery: and M. Carnot's moderation may be praised that, with the infinite resources of this proof, he did not convict Jenner of causing last year's inundation of the Rhone." Singularly enough, the same line of argument is being employed by the opponents of vaccination at the present day.

The very full statistical tables in this pamphlet are a continuation of the similar series which the author presented to the International Medical Congress at Washington in 1887, and they differ from all other observations in this, that, in the case of all persons admitted to hospitals, all persons who died in hospitals, and all persons who died in Budapest and the provinces of Hungary, observations were made as to their condition with reference to vaccination. The statistics of his former pamphlet, with reference to 1886, are also included in this summary. These make in all observations on 53,320 patients admitted to hospitals for ailments of all sorts, 5818 deaths in the same hospitals from all causes, and 58,639 deaths in Budapest and the Hungarian provinces from all causes.

The author makes the same sharp distinction as before between the terms *morbidity*, i. e., the ratio of the sick to the living, *mortality*, the ratio of the dead to the living, and *lethality*, the ratio of the dead to the sick.

In his concluding chapter, entitled *Bilanz der Impfung* (the balance which should be credited to vaccination), he terms the advantage

gained by the introduction of vaccination a *colossal* protection, and if by any possible argument the small percentage of increase from scrofula, erysipelas, and skin diseases could be attributed to vaccination, the loss is outweighed more than three hundred-fold by the saving in the mortality from small-pox.

The British Parliamentary Commission will find in this pamphlet much food for reflection.

S. W. A.

THE SEMI-ANNUAL CENSUS OF CRIMINALS IN MINNESOTA.

In Minnesota, under the direction of the Board of Corrections and Charities, of which Rev. H. H. Hart is secretary, a semi-annual prison census is taken, entirely different, it is believed, from any other prison enumeration in the country. An enumeration of all prisoners is made twice each year, in mid-summer and in mid-winter. No serious difficulties are met, and the results are regarded as satisfactory. The eighth of these censuses was taken December 31, 1891. A synopsis of the returns is published in order to show the method and the nature of the results. The total number of prisoners was 962, of whom 838 were serving sentence and 124 were awaiting trial. The number of prisoners awaiting trial is 50 less than the number December 31, 1890, and is the smallest number ever reported.

Of the 838 prisoners serving sentence 467 are state convicts and 371 are petty convicts, serving sentence in jails or workhouses. The number of state convicts is one less than a year ago, and only 25 more than the number at the close of 1885, so that the increase of state-prison convicts in the past six years has been less than 6 per cent.

The number of petty convicts is 80 more than it was a year ago, but most of this increase is found in the Minneapolis city workhouse, whose inmates have increased from 96 December 31, 1890, to 157 December 31, 1891. The number of inmates in the St. Paul city workhouse decreased from 194 December 31, 1889, to 118 December 31, 1891.

The total number of prisoners of all kinds in the state has increased 15 per cent in the past six years, and has decreased 6 per cent in the past two years. The prison census is shown in the following table : —

At Midnight.	Dec. 20, 1885.	Dec. 31, 1888.	Dec. 31, 1889.	Dec. 31, 1890.	Dec. 31, 1891.
Prisoners awaiting trial—					
In city and village lockups.....	62	52	49	38	33
In county jails.....	122	114	118	136	91
Total awaiting trial.....	184	166	167	174	124
Prisoners serving sentence —					
In city and village lockups.....	7	....	7	3	6
In county jails.....	96	71	70	63	88
In St. Paul city workhouse.....	105	146	194	124	118
In Minneapolis city workhouse...	....	117	126	96	157
In House of Good Shepherd.....	2	8	8	5	2
Total petty convicts.....	210	342	405	291	371
In state prison.....	442	421	354	329	336
In state reformatory.....	....	....	97	139	131
Total state convicts.....	442	421	451	468	467
Total serving sentence.....	652	763	858	759	838
Grand total number of prisoners...	836	929	1023	933	962

STATISTICAL ARTICLES IN MAGAZINES AND JOURNALS.

Journal de la Société de Statistique de Paris. April, 1891.

Étude sur les placements faits à l'étranger par les différents peuples.
By M. Georges Martin.

M. Martin makes an elaborate study of the financial relations of various civilized nations, as shown by the Bourse quotations in their principal cities. Inasmuch as the tables are concerned simply with the number and general classification of the securities quoted, the results obtained are exceedingly general, but have considerable value as showing the general direction of foreign investments in the several countries. The estimation of these debts in quantity would be rendered difficult by variations in the volume of coin in circulation; by the impossibility of obtaining complete data save by examination of the books of the great banking houses; and by the diversity of laws governing the admission of stocks and quotations. Even in this qualitative comparison the results are rendered misleading by reason of tax laws, and the consequent institutions of private bourses, as, for instance, the number of quotations on the Paris Bourse is largely

diminished by the taxes laid on transfers of foreign obligations and government securities. Another misleading factor is the great diversity in the form of securities, which may be with us divided into common and preferred stock, into first mortgage, income or debenture bonds, etc. The French custom is to do away with such distinctions, and issue all stock or bonds in a single form.

Holding in mind these various limitations the general results of the investigation are shown as follows:—

TABLE SHOWING THE NUMBER OF FOREIGN SECURITIES QUOTED IN THE MARKETS OF VARIOUS CREDITOR STATES.

	England.	Germany.	France.	Holland.	Belgium.	Switzerland.
Gov't securities.....	265	144 ¹	109	108	89	26
City and provincial loans.....	100	70	4 ³	4	25	7
Stocks.....	743	104	118	100	85	49
Bonds.....	505	264	103	174	113	61
Total quotations.....	1613	591	334 ¹	386	312	143
Quotations peculiar to each country. }	1200	115	140	107	99	25

¹ The apparent inferiority of France is ascribed to restrictive legislation on Bourse transfers. ² Certain loans of Austro-Hungarian Seigneurs. ³ Algerian loans.

The following table shows the distribution of investments according to locality:—

	England.	Germany.	France.	Holland.	Belgium.	Switzerland.
Europe.....	212	465	176	164	231	106
Asia.....	13	2	1	....	1	....
Africa.....	41	9	23	13	7	11
America.....	737	115	60	167	73	26
Oceanica.....	6	....	4	....	....	....
Miscellaneous..	46	....	13	....	....	....

The following conclusions are drawn from the tables. England is by far the greatest foreign investor among nations, and American securities form nearly one-half of its quotations; three-quarters of them, if colonial securities are excluded. State funds here form a small fraction of the total, much less than in Germany or France. The English thus appear to be more ready to assume risks, with the hope of increased returns, than are other European nations, and the proportion of low-interest investments, such as European government

securities, is small. It also appears from other tables that the Scotch are yet more adventurous than the English. After the United States, England chooses her American investments in the Argentine Republic, Brazil, and Chili.

The small number of private securities, and the absence of provincial and city loans in the French quotations, is accounted for by the unfavorable legislation, and the results for France are thereby rendered unsatisfactory. The United States is represented by one Federal bond and one corporation.

Germany is the next great creditor among nations. Whether it is more important than France is uncertain, the relations being obscured by French restrictions. An especial feature is the large number of loans of the minor civil divisions; and doubtless this is a consequence of the socialistic extension of government activity, together with the admirable system of local corporations. A marked difference is discovered between the Bourses of Berlin and Frankfort; a larger proportion of American securities and city and provincial loans being quoted at the Bourse at Frankfort, while Berlin is mainly occupied with government securities of European countries. Except United States investments, Germany appears to be partial to European securities, particularly in the centre, north, and east. Spain is but slightly represented on the German Bourses.

The Bourse of Amsterdam is represented by a large number of quotations, and the United States absorbs one-third of them (128). Russia is the next in order, with 69 quotations. Finally, the number of foreign securities quoted at Amsterdam far exceeds the number of Dutch quotations in other markets, thus apparently placing Holland prominently in the list of national creditors.

Belgium is represented by a large number of quotations, but admission to the Bourse is especially easy, and many stocks are there which would be excluded from other markets. Here Italy leads with 40 quotations. France and the Argentine Republic follow with 37 each. The United States is represented by nothing but the Federal 4's and $4\frac{1}{2}$'s.

The Swiss quotations are not large in number but are about evenly distributed, with a preference for Italy and Austria. The United States is represented by 9 railroads.

As to the debtor nations, the following facts are presented. The United States is by far the most considerable debtor, being repre-

sented abroad by 489 investments, or one-sixth of the sum total. Of these 222 belong exclusively to European markets and are not quoted in America, as follows: 5 state bonds, 11 city loans, 82 stocks (17 being railroads), 114 bonds (93 being of railroads). The total value of these 222 investments is estimated by the author to amount to \$694,000,000, with an interest account of about \$34,700,000. The minimum of the total interest account due other countries is estimated as follows:—

Securities owned in Europe exclusively,	\$34,700,000
Stocks, bonds, loans, etc. quoted in Europe and America,	54,000,000
Federal loans at 4 and 4½ per cent,	5,000,000
Total,	\$93,700,000

In return for the payment of this enormous annual account coupons of foreign securities are received yearly, amounting to about \$8,000,000. There is thus a drain upon the United States, according to M. Martin, of over \$80,000,000 a year. This is apparently divided between England, Holland, and Germany in decreasing proportions.

Australia follows next on the list of debtors, and then Austro-Hungary with 206 foreign quotations. The Argentine Republic is represented by 123 securities abroad. Russia has 144 foreign quotations. The list is closed by Italy, India, Spain, Brazil, Mexico, and the South American Republics, with many of the minor countries of Europe and the East.

In conclusion, all of the creditor states appear to be in West Europe, except Hong Kong, which is really a dependency of England. England, France, Germany, Holland, and Belgium alone can exact tribute from all the other countries of the world. They alone can import more than they export without bringing on financial stringencies. Their relations to their debtors make them more or less independent of the tariff systems of others; whereas, they, by restricting their markets for the goods of other nations, especially the United States, have it in their power to drain those countries of coin to an enormous extent.

WILLIAM Z. RIPLEY.

Journal des Economistes. Sept., 1891.

The Progress of Paper Money. By E. Fournier de Flaix.

The Argentine Republic, Uruguay, and Chili, among the most prosperous of South American nations, have within a few years resorted to issues of paper money. Greece has followed, and Austria,

Italy, Portugal, Spain, and Russia are fast coming to such financial straits that they must issue a paper currency.

The finances of Italy are in a serious condition. Were France to withdraw from the Latin Union, over 400,000,000 francs must be given up to her: moreover, over 150,000,000 francs must be exported yearly to pay interest on her debt, four-fifths of this going to France. The support of France is all that prevents Italy, then, from the evils of paper currency.

Portugal is even more dependent than Italy, being mortgaged to England, with an annual interest payment of 155,000,000 fr. The establishment of a national bank in 1887 and her gold standard gave a good foreign credit; but this has been shaken by exploitations in Africa and the crisis in the firm of Baring Bros., who were their representatives in England. She mortgaged her revenues by a sale of the tobacco monopoly, and projected vast financial and economic reforms. The Bank of Portugal has now received the right to issue inconvertible notes, in order to tide over its difficulties. The state of affairs appears to be such that this will become a permanent medium.

In Spain the burden of yearly deficits has been shifted upon the Bank of Spain by means of loans, and now amounts to over 600,000,000 francs. 280,000,000 fr. of a budget of 800,000,000 are devoted to interest account. Now, in face of all this debt, the Liberals have granted permission to the bank to extend its circulation to an enormous sum, so that the present circulation varies from 745 to 740 million francs, and may be increased yet further, the government being recompensed by large loans. Here then is such a close connection between state and bank that the country is virtually flooded with a useless mass of paper money. Already there is a depreciation of nearly 10 per cent, 7 per cent of this being due to the last extension of the paper money circulation.

The republics of South America are in a worse state, but being young, and having vast natural resources, the future prospect is more favorable.

Such depreciation, now reaching in South America 60 per cent, in Austria and Russia 20-30 and even 40 per cent, surely cannot go much farther without national bankruptcy and commercial disaster.

WILLIAM Z. RIPLEY.

The Monetary Circulation in France.

By request of Parliament the amount of money in the hands of the government, together with that in the three great banking establishments of France, has been recently determined. All moneys in gold, and five-franc pieces in silver, in the hands of collectors or other government officials, in all branches of the Banks of France and of Algeria, the Crédit lyonnais, and the Société générale, were counted. On April 22, 1891, the total circulation in these places was 120,500,000 francs, of which 97,000,000 were in bank notes, and 23,500,000 in specie. About 70 per cent of the specie is in gold, and 30 per cent in silver. 88½ per cent of the gold is in French coins, and the rest is classed as follows: 52 per cent Belgium, 34 per cent Italian, 11 per cent Austrian. Of the silver 69 per cent is French and 31 per cent of foreign coin. The department of the Seine has relatively less gold than six of the other departments. As a rule, the departments in the south central part of the country have the greatest proportion of gold, while those on the frontiers and sea-coast possess a relatively larger amount of silver.

W. Z. R.

Revue d'Économie Politique. May, June, 1891.

Une statistique des mariages. By Prof. Harald Westergaard.

The following tables, taken from this article, give the average age of marriage in different classes of society in Copenhagen and the island of Funen.

COPENHAGEN.

	Men.	Women.
Bankers, merchants, professions, etc.....	32.2 years.	26.5 years.
Petty employers, artisans.....	31.2 "	27.6 "
Clerks.....	29.7 "	26.5 "
Servants and sub-employees.....	28.0 "	26.8 "
Day laborers, unskilled workmen.....	27.5 "	26.8 "

FUNEN.

	Men.	Women.
Employers, capitalists, landed proprietors.....	31.3 years.	26.7 years.
Artisans, merchants, etc.....	29.5 "	27.6 "
Petty employers, etc.....	30.0 "	26.9 "
Peasant proprietors.....	32.3 "	27.8 "
Laborers with property.....	33.5 "	31.3 "
Day laborers.....	30.2 "	29.6 "
Servants.....	28.7 "	27.6 "

The next table shows the relative increase of the several classes : —

COPENHAGEN.

	Children per Marriage.	Total Births.*	Children Living.*
1. Employers, etc	3.44	97	109
2. Shopkeepers.....	3.22	94	97
3. Clerks.....	2.57	84	90
4. Sub-clerks.....	2.87	90	94
5. Laborers.....	3.01	100	100
Average number.....	3.00	....	....

* Class 5 being the basis at 100.

The last table shows the relation of number of children to mortality.

	Of 100 Children	Of 100 Families	
	have died	were born	lived
Family of 1 child.....	20.0	100	80
" " 2 "	19.1	200	162
" " 3 "	25.1	300	225
" " 4 "	23.1	400	306
" " 5 "	24.5	500	377
" " 6 "	31.1	600	413
" " 7 "	35.8	700	449
" " 8 "	40.3	800	478
" " 9 "	52.5	900	427

These illustrate the familiar facts that marriage, as a rule, occurs at a later period of life for men than for women; and that the disparity in ages is less in the lower ranks of society than in the upper classes. Fewer children are born to a marriage in the higher social grades, but far more children survive. Finally, as the size of the family increases, the mortality becomes greater, not only absolutely but relatively, the vitality being considerably higher. These facts are not new but are very clearly illustrated and proven by the tables, and in this clearness lies the value of the article for the statistician and publicist.

WILLIAM Z. RIPLEY.

Revue d'Hygiène. November 20, 1891.

De la Morbidité et la Mortalité par Professions. By Dr. Jacques Bertillon.

This article is based upon the records of the city of Paris for the five years 1885-89, and contains many diagrams and tables showing

the death rate per 1000 living males for each of the more common occupations and at different age periods. There are also comparative tables to show that those results compare very favorably with the results of similar investigations in England and Switzerland. The limited space will not allow a review of the whole article, so that the mere conclusions of Dr. Bertillon must suffice.

The investigation is made on the mortality statistics for four age periods, and for the male population only. These age periods are 20–29 years, 30–39 years, 40–49 years, and 50–59 years. The average death rates of males in Paris for these different age periods are 11.1, 14.9, 21.2, and 31.2, respectively. The occupations are classed in eleven groups as follows: —

1. *Occupations exposing the individual to the inclemencies of the weather and with irregular hours of sleep.* Such are, notably, the occupations which coachmen, hack drivers, and car drivers follow, and the death rates among this class are higher than all others for each of the age periods; these rates are, respectively, 16.4, 20.5, 32, and 58.

2. *Occupations exposing individuals to the weather but with regular hours for work and for sleep.* These professions are as healthful as the preceding class are injurious. Among those who follow such occupations are farmers, kitchen-gardeners and florists, game-keepers, etc. Fishermen and boatmen also, in certain respects, belong to this group. The mortality for the four age periods is 11.1, 13.6, 21.6, and 30.

3. *Occupations exposing individuals to the respiration of dry dust but in the open air.* This group comprises such occupations as stone-cutting, masonry, etc., and the rates of mortality are 9.5, 16, 23.7, and 31.4. For quarrymen, however, the rates are much higher, being respectively, 20.1, 21.2, 23.4, and 39. The high mortality in this class of laborers is due to phthisis and other lung troubles, which seem to be aggravated by the dust which the men breathe. Deaths from violence also are very numerous.

4. *Occupations exposing individuals to the respiration of dry dust but in confined places.* Such are the occupations of machinists, locksmiths, gunsmiths, potters, brushmakers, etc. The mortality in this class is somewhat lower than in the preceding group.

5. *Occupations exposing individuals to the respiration of soft dust (poussières molles).* This class includes millers, bakers, weavers, etc. The mortality here is not so great as in the preceding class.

6. *Occupations exposing individuals to excessive heat, to smoke, or to steam.* This class includes blacksmiths, glass workers, crystal workers, etc. The mortality is not very high in Paris, but the rates are much higher in Switzerland and England. Mechanics have an average mortality. Bakers owe their high rates, no doubt, to the dust they breathe, glass and crystal workers to the substances they handle.

7. *Occupations exposing the individual to the absorption of injurious substances.* Such occupations include lead workers, file makers, painters, potters, printers, etc., and the rates are comparatively high, 16, 24, 28, and 42, respectively.

8. *Occupations exposing individuals to the use of alcohol.* Such are, notably, wine merchants, bar-tenders, etc. But the rates in Paris (12, 21, 25, and 30) are less than in England and Switzerland.

9. *Occupations exposing men to accidents.* Such occupations, for example, as mining, are subject to high rates of mortality from this cause. Coal and iron miners would have a very fair rate of mortality were it not for the numerous accidents to which they are subject. The same may be said of fishermen.

10. *Sedentary occupations.* Some of these occupations are well favored because they are exercised in the open air, as, for example, that of fruit and fish dealers; for this class the average rates are 6, 8, 9, and 12. Other sedentary occupations are, on the contrary, very unhealthful; dry-goods clerks, for example, have the high rates of 15, 25, 40, and 49, respectively, for the four age periods. Mortality among tailors is equally high, while that among rope and clock makers and engravers is low. Bankers and bank clerks have a high mortality.

11. *Liberal professions.* Priests, magistrates, etc., have a very low death rate; lawyers, architects, and engineers have rates lower than the average. The mortality among doctors is very low in Paris, but this is not true of England and Switzerland, where the mortality of this class is greater than the average.

Dr. Bertillon states the difficulties which surround the correct interpretation of such statistical results, and shows the many obstacles to the collection of so many and such diverse facts. The results, however, correspond to those obtained in England and Switzerland, and from the tables comparing the various professions the relations of some of them to the average rate of mortality for all male occupations have been made out.

The following classes of workmen have a mortality *less* than the

average mortality for all occupations at different age periods : farmers, gardeners, florists, game-keepers, fishermen, boatmen, lace and silk workers, smiths, machinists, iron workers, moulders, tanners, leather makers, carpenters, wood carvers, carpet makers, straw workers, hat-
ters, sugar refiners, butter, cheese, egg and fruit merchants, grocers, jewelers, lapidists, watch and clock makers, bronze workers, postmen and telegraph operators, clerical gentlemen, lawyers, physicians and surgeons, professors, directors of schools, teachers, and architects.

The following classes of workmen, however, have a mortality *greater* than the average for all occupations : steam fitters, lead and zinc workers, wood turners, coopers, locksmiths, masons, stone cutters, sculptors, quarrymen, painters, glass workers, plasterers, decorators, plumbers, tailors, cobblers, barbers, bakers, confectioners, wine and liquor merchants, wagon makers, printers, lithographers, engravers, book-binders, coachmen, car and omnibus drivers, hostlers, dry-goods clerks, hosiers, solicitors, public ministers, and instructors of music, dancing, drawing, and fencing.

GARY N. CALKINS.

The Archiv für Eisenbahnwesen. August, 1891.

Prozentberechnung über den Personenverkehr.

This treats in an interesting way the percentage statistics of the passenger traffic upon the royal Prussian State railways for the three months, December, 1889, March and July, 1890. The details are set forth in comprehensive tables of which the following is a collected summary : —

RELATION OF PASSENGER CLASSES.

Classes.	Number of Passengers.	Receipts. M.	Per Cent of Total Passengers.	Per Cent of Total Receipts.
1st class.....	237,943	1,996,182	.004	.039
2nd class.....	5,850,164	13,794,801	.008	.271
3rd class.....	29,099,576	21,947,275	.488	.430
4th class.....	24,466,863	13,317,699	.409	.280
Total.....	59,644,546	51,055,957	1.000	1.000

This shows the general unprofitableness of first-class passenger traffic upon European railways. It is also a noteworthy fact that while of the total number of passengers 45.8 per cent travelled less

than 10 kilometres, and 88.7 per cent less than 50 kilometres, yet only 37.4 per cent of the total receipts were obtained from those passengers who were transported distances less than 50 kilometres.

Die Güterbewegung auf deutschen Eisenbahnen in Jahre 1890.

The freight traffic over German railways in 1890 is compared with that of 1889, 1888, and 1887. The same subject is treated by quarterly periods from 1885 in the following issue, where the comparative tonnage of different kinds of freight is shown by statistical tables and graphical charts. The official reports of various European railways have been summarized, among them those of Belgium for 1889, of Spain for 1888, of the Netherlands for 1889, of Wurtemberg for 1889, of Switzerland for 1889, of Denmark, Norway, and Sweden for 1889, and of the royal-imperial railways of Austria.

VICTOR ROSEWATER.

Conrad's Jahrbuch. July, 1891.

Die Ergebnisse der Konkursstatistik. By Dr. A. Wirminghaus.

The extensive study of the statistics of bankruptcy, by Dr. A. Wirminghaus, is continued through the July, August, and September numbers. The author analyzes in detail the figures attainable for all the important civilized countries. The problems upon which he attempts to throw light are the number of bankruptcies, whether declared at the instance of creditor, debtor, or the courts; the distribution among different occupations; the amounts put in liquidation; the causes of the bankruptcy and the financial results of its legal termination. The bankruptcy statistics as presented vary greatly in different countries, and their incompleteness renders any present conclusions impossible.

Frauenarbeit. By Prof. Stieda.

[August.

This article presents an interesting discussion of the labor of women. Prof. Stieda shows that the excess of females over males in Europe, even if the latter were all able and willing to support a wife, would still require a large number of women to be self-sustaining. This number is further increased when we remember that over 10 per cent of the men remain unmarried. After tracing the historical development of the labor of women, the question of its extent in Europe today is taken up. The proportion of the number of working women to that of the whole laboring class is very irregular; it is 40 per cent in Italy; only 11 per cent in the United States. In Germany

the number per 100 of adult women engaged in laborious pursuits runs from 17.1 per cent in Schleswig-Holstein to 49.8 per cent in South Bavaria. Prof. Stieda gives a list of industries with the ratios of male and female employes; the number of women in the building trades seems to be decreasing, in the others increasing. In Germany the increase in the number of working women from 1875 to 1882 was 26.1 per cent, while the increase in the total number of laborers was but 17.6 per cent. The conclusion reached is that the labor of women should be restricted in extent, not suppressed; that the state should interfere so far as to prescribe regulations for maintaining health and morality, and should enforce its laws stringently. V. R.

Archiv für soziale Gesetzgebung und Statistik. IV, No. 2, 1891.

Neuere Untersuchungen über die Lage der arbeitenden Klassen in Holland. By Dr. Otto Pringsheim.

Authoritative statistical information is given concerning the hours of labor, the dwellings and wages of workingmen in Holland,—the results his recent study of the condition of the laboring classes in that country.

Zeitschrift des K. Sächsischen Statistischen Bureaus. 1890. Nos. 3-4. Dresden, August, 1891.

The larger part of this issue is devoted to the movement of population in Saxony during 1889, and to the statistics of savings banks in that country from 1849 to 1888. The following summary presents the principal vital statistics of the year with comparison with the immediately previous years, upon the basis of 1000 of the population:—

	1876-80	1881-85	1886	1887	1888
Marriages.....	8.86	8.92	9.27	9.18	9.06
Births.....	43.42	41.82	42.41	41.84	41.89
Deaths.....	28.59	28.88	29.88	26.91	25.96
Increase.....	14.83	12.94	12.53	14.93	15.93

The savings banks have grown with steady regularity. The value of the average individual deposit in 1849 was 143 marks, and in 1888, 355. The highest point this has ever reached was in 1878 and 1880, when it equalled 372 marks. This indicates that the crisis which came in 1873 had compelled the person of limited means to draw out his deposits. Since 1880, however, the depositor has renewed his efforts.

In 1849 there was one deposit book to 23.24 of the population, and in 1888. 2.24, thus showing a remarkable adoption of the system.

Journal of the Royal Statistical Society. London. June, 1891.

On Prison Ethics and Prison Labor. By F. J. Mouatt, LL.D. Relates especially to conditions in Lower Bengal in India.

The Charitable Aspects of Medical Relief. By Dr. J. Charles Steele. Shows the accommodations of the London hospitals, and cost of maintenance.

Results of the recent census and estimates of population in the largest English towns. By Noel A. Humphreys. Analyses of statistical returns of 28 English towns: Area, 258,869 acres; persons to an acre, 36.2; population, 1891 (unrevised), 9,379,711; increase per cent, 1881-91, 11.2. Argues that decennial censuses are misleading for calculation of birth and death rates in intermediate years. In Liverpool, for example, the death rates in 1889 and 1890 were estimated at 21.6 and 23.6, when it is now seen that they were 25 and 27.8.

Preliminary returns of the Census in India (1891). Population will amount to 286 millions, of which 65½ are under feudatory rule. The increase during the decade was 29 millions.

Influence of custom duties on the price of wheat. By A. de Foville.

Influence of civilization upon the movement of the population. By P. Leroy-Beaulieu.

On the Nature and Uses of Averages. By Dr. John Venn. [Sept.

Dr. Venn discusses the various sorts of averages which can be used, and compares in particular the median and arithmetical average. For the bulk of statistical inquiry he concludes that almost any kind of average will answer the purpose. For accurate quantitative results the selection of the kind of average must depend upon the precise object we have in view. In certain cases he suggests whether there is a necessary gain in using any kind of average. This paper, as well as the remarks made by Mr. Francis Galton and Prof. Edgeworth, is of great interest.

Notes on the preliminary returns of the censuses 1890-91.

A résumé is given of the census returns of France, Germany, Austria, Hungary, Denmark, Norway, Cape Colony, and Victoria.

The Zone system on the Hungarian railways.

This is the translation of an article by Dr. Amboise Nemenyi, originally published in the *Revue d'Economie Politique*.

The progress of hippophagy in France and on the Continent as shown from statistics. By Ch. Morot.

It is shown that there is an increase in the consumers of horses, asses, and mules. In several places in France ordinary butchers are seriously alarmed by the competition of the new trade.

Journal of the Statistical and Social Inquiry Society of Ireland. Sept., 1891.

The Congested Districts. By Richard J. Kelly.

Bank Reserves and Currency Reform. By Professor C. F. Bastable. Favors the establishment of a single issuing body for the United Kingdom.

Irish Progress during the past ten years, 1881-1890. By T. W. Grimshaw, M.D., Registrar-General. Considers the vital statistics, valuation, agriculture, trade, manufactures, capital, loans, banking, taxation and revenue, post-office, education, and poor relief. The conclusions are summed up in the following table:—

	1881.	1890.	Increase.	Decrease.
Valuation per head of population in £	2.70	3.00	0.30	....
Valuation of agricultural land per head of rural population in £.....	2.60	3.10	0.50	....
Acres of cereal crops per head of population.....	0.34	0.32	....	0.02
Acres of meadow and clover per head of population.....	0.39	0.45	0.06	....
Acres of all crops per head of population.....	1.00	1.05	0.05	....
Heads of cattle per head of population (3 sheep = 1 head of cattle).....	0.08	1.21	0.23	....
Acres of grass lands per head of cattle.....	2.00	1.80	....	0.20
Gallons of whiskey distilled per head of population.....	1.80	2.80	1.00	....
Barrels of beer brewed per head of population.....	0.37	0.53	0.16	....
Railway capital in £ per head of population.....	6.60	7.70	1.10	....
Railway receipts in £ per head of population.....	0.50	0.65	0.15	....
Tons of shipping per head of population.....	2.09	2.23	0.14	....
Cash balances, etc. in Joint-Stock Banks in £ per head of population.....	5.80	7.10	1.30	....
Deposits in Saving Banks in £ per head of population.....	0.70	1.20	0.50	....
Customs receipts in £ per head of population.....	0.38	0.45	0.07	....
Letters delivered per head of population.....	15.90	21.30	5.40	....
Number of persons relieved under Poor-law Acts per 1000 of the population.....	114.20	97.10	....	17.10

The Economic Review. October, 1891. London.

The Fourteenth Report of the Commissioners of Prisons for the year ending March 31, 1891, is analyzed on page 554. An analysis of sentences shows that crimes of dishonesty or malice have largely de-

creased; that crimes against social discipline have about kept pace with the population; and that drunkenness has largely decreased. Attention is called to the barometric scale of crime, by which it appears that crime has a tendency to run high in October. Comparison is made with the statistics of pauperism, and it is concluded that extreme poverty does not appear to increase crime.

The Preliminary Report on the Census of England and Wales, 1891, is discussed by Mr. Edwin Cannan, and some fresh conclusions are drawn. An interesting table showing the number of persons per thousand of England and Wales in nineteen different divisions at each census, 1801-1891, is drawn up. It is concluded that it is impossible to show the distribution of the population between country and town.

In making these references to the *Economic Review*, attention should be called to the excellent and valuable summaries of Parliamentary inquiries and official returns made by Mr. Cannan in each number.

Transactions of the Manchester Statistical Society. 1890-91.

The Local Taxation of Chief Rents. By Prof. Munro.

Our Note Bank System. By Thomas B. Moxon. Gives statistics of banking circulations of different countries.

Pauperism, past and present. By J. M. Rhodes.

Illustrates the paper by maps of England, showing the density of population, coal production, indoor pauperism, outdoor relief, tax rates in the pound, brewers licensed for the sale of intoxicating liquors, coöperators, friendly societies, savings banks, wages of agricultural laborers.

The Fortnightly Review. December.

The Canadian Census. By J. G. Colmer.

The growth of the population in Canada between 1881 and 1891 increased only 11.66, by no means meeting expectations. The article presents various explanations for the disappointment, and predicts greater progress in the next ten years.

The Charity Organization Review. London. December, 1891.

Character and development of the German Labor Colonies, from the opening of the first colony in 1882 to 1889. By Dr. Berthold.

This is based upon a more complete article on the Statistics of the German Labor Colonies, by the same author, published in Berlin, 1891. Several pages of statistics are given, showing the length of stay in the colonies and the reasons for discharge.

